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BOTH

Philoſophical and Practical;

Explaining the

MOTION of the SAPP AND GENERATION of PLANTS.

With other Diſcoveries never before made Publick, for the Improvement of Foreſt-Trees, Flower-Gardens or Parterres; with a New Invention whereby more Deſigns of Garden Platts may be made in an Hour, than can be found in all the Books now extant. Likewiſe ſeveral rare Secrets for the Improvement of Fruit Trees, Kitchen-Gardens, and Green-Houſe Plants.

Adorn'd with COPPER PLATES.

The Third and Laſt PART.

The Second Edition.

By *RICHARD BRADLEY*, Fellow of the ROYAL SOCIETY.

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BRITISH MUSEUM

To the Right Honourable

JAMES

Earl of *Caernarvon*,
Viſcount *WILTON*,
AND
Baron of *Chandois*, &c.

My LORD,

THE beſt Reaſon I can give that theſe Papers claim Your Lordſhip's Protection is, That they endeavour to advance, in a ſmall Inſtance, the Good of our Country, and the Be-

Benefit of Mankind. YOU are ſo kind an Encourager of every thing which looks that Way, that I promiſe my ſelf even this mean Attempt will not fail of ſome Countenance from Your Lordſhip, which is the ſureſt Means of its being acceptable to the reſt of the World. They who ſhall happen to profit by this Work, will owe the greateſt Debt to your Lordſhip, ſince your Name will be the beſt Recommendation of its Worth. But that my Imperfections may not entirely take Shelter under ſo great an Authority,

rity, I do aſſure Your Lordſhip, that I have omitted no Pains to make it as compleat as I could; and what it ſtill wants of being ſo, may well be imputed to my Diſtance from Your Lordſhip's improving Thoughts, by the ſhort Experience I have had of them in Relation to this Subject; I am ſure that my Obſervations have loſt much for want of ſo juſt Corrections.

My Lord,

It would be as improper in me, as diſagreeable to You, to talk of the great Merit and Eſteem

You ſtand in with all Mankind. The Publick feels the Benefit of all Your Actions, and will do You Juſtice without my reminding them. My Hopes of not offending Your Lordſhip ariſe wholly from the Uſefulneſs of the Subject of this Work; and I humbly beg it may be accepted as an Inſtance, that I can diſtinguiſh a little, as well as the reſt of the World, in my profeſſing my ſelf,

My LORD,
Your Lordſhip's moſt Dutiful
And Obedient Humble Servant,

BRITISH MUSEUM

R. BRADLEY.

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PART III.

CHAP. I.

Of the VINE, FIG, L'AZZEROLE, *and* MULBERRY.

THE Fruit I ſhall firſt treat of is known all over the civiliz'd Part of the World; and its Qualities more generally admir'd than any other Fruit growing upon the Face of the Earth: And yet notwithſtanding the vaſt Tracts of Ground in *Europe* and elſewhere, which are found planted at this day with *Vines*, there is hardly any Plant ſo unskilfully order'd in our *Engliſh* Gardens, or ſo little underſtood by our Gardeners.

SECT. I.

Of the VINE.

THE End of planting *Vines* is certainly to have good Store of *Grapes*; but the way to attain a large Quantity of good *Grapes*, does not only depend upon the Choiceneſs of the Sorts we plant, the Nature of the Soil they require, and the proper Scituation for them; but above all, the Times and Methods of pruning are abſolutely neceſſary to be underſtood.

The Kinds which I find to ripen beſt in *England* are, the *July Grapes*, the *Black Currant Grape*, the *Early ſweet Water Grape*, lately brought from the *Canaries*, the *Arbois* or *French ſweet Water Grape*, which are all ripe with us by the middle of *Auguſt*, if rightly managed, and the Seaſon be kind; and after them the *Muſcadines*, *Parſly Grapes*, *Fronteniacs*, *Claret* and *Burgundy Grapes*: I have ſeen all theſe in great Perfection with us, but I know not of any other Kinds early enough to ripen well in our Climate.

'Tis then of theſe Kinds I would chiefly adviſe to be propagated, which may be done either by laying down the young Branches as ſoon as the Fruit is gathered, or by making Plantations of Cuttings at that time, always minding to let a Bud or two of the Layer or Cutting be under Ground; for it is from thoſe Buds only the Roots put forth. I have alſo frequently made Layers in *March* and *April*, which have been fit to tranſplant the *Michaelmas* following; and I have known it practis'd to draw a young Branch thro' the Hole at the Bottom of a Garden-Pot about *Chriſtmas*, and then filling the Pot with Earth, it has took root and been cut from the Mother-Plant the *Michaelmas* following, with ripe Fruit growing upon it. The *Vines* thus raiſed in Pots, will hold their Fruit good almoſt till *Chriſtmas*, if they are ſhelter'd from the Weather in a Green-houſe or ſome ſuch like Place; and it is eaſy to conceive how pleaſant it will be to have them brought thus growing to the Table in a Deſert.

By what I have obſerv'd in planting of *Vines*, the Month of *February* is the beſt, if the Weather be open; and great Care muſt be taken in the Removal of this Plant, that the Roots be not too dry before it be replanted, for that would greatly endanger it: Therefore wet Moſs wrapp'd about the Roots, if they are to be ſent to any remote Place, has been practis'd with good Succeſs.

Concerning the *Soil* proper for *Vines*, I ſhall give the firſt Hint from that ingenious and candid Piece of Mr. *Laurence's*, where with ſo much good Reaſon he tells us, that he cannot eaſily be brought to think any Soil or Scituation can be too dry for the Roots of the *Vine*, after having ſeen at *Barnwall* near *Oundle* in *Northamptonſhire* a flouriſhing *Vine* grow from between the Joints of an old Caſtle-Wall near 20 foot high from the Ground, which he was told produced admirable *Grapes* when it was well managed. This Obſervation of that curious Gentleman might be ſufficient of its ſelf to inform us of the Property of the Soil requir'd for *Vines*, without ſeeking after other Experiments to ſatisfie us in it.

In the Gardens of my worthy Friend Mr. *Balle* at *Cambden-Houſe*, there are now growing ſeveral *Vines* in the Walls, ſome of which were planted there by that Gentleman's Direction; and one in particular, which is a *Muſcadine*, produces every Year fairer Bunches of Grapes, much ſweeter, and earlier ripe (at leaſt a Fortnight) than any other *Vines* in his Garden, altho' he has the beſt Collection of forward Grapes I have yet met with in *England*.

But yet farther, if we take a View of the *Vineyards* abroad, which afford the richeſt and beſt Wines, we find the Soil either rocky or gravelly. The *Chianti*

Wine of *Italy*, for Example, grows upon a high Ground in a rocky Soil like to that which they make Lime of; and the ſtrong *Spaniſh* Wines are the Growth of the Mountains, which will hardly produce any other Kind of Plant, they are ſo extreamly dry: In a word, all the Places which I have ſeen or heard of, which produces good Grapes, have a dry, hot Soil, and are ſomewhat Mountainous.

From ſuch Obſervations, and ſome Experience I have had in the Culture of the *Vine*, I find chalky Hills, ſuch as are frequent enough in *Oxfordſhire*, are very proper to plant *Vines* upon, if they lye well expos'd to the Sun; So, hot gravelly Ground which lies dry and warm, will produce better Grapes than any of the rich Soils prepar'd with Horſe-dung; but in a Garden where either of theſe Soils are wanting, the Rubbiſh of ſome old Building will very well ſupply the Defect, if it be well ſifted and mix'd (about one third part) with the Earth about the Roots of the *Vines*.

I think I need not ſay how much the ripening of ſome Sorts of Grapes depends upon a good Wall, and warm Expoſure, and that even with thoſe Helps, we ſometimes fail of ripe Grapes, It may not be amiſs then, to conſider of ſome Ways that may expedite the budding out of the *Vines*, and conſequently by making them bloſſom earlier than uſual, may haſten the growth and ripening of the Fruit while we enjoy the Summer Sun.

As the proper Soil and right Expoſure for *Vines* contributes to the early ripening of Grapes, ſo the right Seaſon for general Pruning likewiſe is helpful to the ſpeedy perfecting of the Fruit, as I ſhall ſhew afterwards; but ſhall firſt take notice of an Obſervation or two of *Vines*, that were made to ſhoot near two Months ſooner than Nature would of her ſelf have given them Motion. In *Kenſington* I have obſerv'd a *Vine*, that happen'd to be planted againſt a Baker's Oven, to ſprout in the beginning of *March*, and continue from that time to ſhoot vigorouſly all Summer; and although it had very little Advantage of the Sun's Heat, and grew in a ſtiff wet Ground, the Grapes ripen'd much ſooner than any others of the ſame Kind: But at the *Pot-Houſe* at *Fulham*, where the Soil is ſandy, and the Expoſure warm, there was a *Vine* planted againſt an Oven which was conſtantly kept hot for baking of Earthen Pots, that began to Bud about *January*, and would, as I am inform'd, have ripe Grapes in *June* by the help of a Glaſs Frame which was uſed to cover it in ſevere Weather; and ſo to plant a *Vine* againſt the back of a Chimney where a Wood or Turf Fire is conſtantly kept, ſo as to warm the Bricks, it will by that means ſprout early, and have its Fruit ſooner perfected than other *Vines* which have not that Help, as I have experienced.

Suppoſing then, that a *Vine* by this Means is brought to Shoot or Bloſſom earlier than uſual, let us not deceive our ſelves with the too common Opinion, that the expoſing the Bloſſom or young Fruit immediately to the Sun, will be a means of haſtening its Maturity, or making it large, and as ſome do, to pull away the Leaves from about it; for that rather retards the ripening, than forwards it, by contracting ſo much the outſide Skin of the Fruit, that it cannot receive the Nouriſhment it ought, and would otherwiſe admit of; and I am ſure whoever knows any thing of the Growth of *Vegetables*, will allow, that Shade always contributes to the large Growth of Plants and Fruits, and that the Heat of the Sun is chiefly requiſite for the ripening of Fruits; therefore let the young growing Fruit always remain ſhelter'd with its Leaves till it be full grown, and then begin to lay it open to the Sun for ripening.

I ſhall next conſider the *Pruning* of *Vines*, eſpecially of thoſe growing againſt Walls; for it is a right knowledge of the Seaſons and Manner of Pruning, which chiefly contributes to give us a plentiful Store of good ripe Fruit.

It is commonly practiſed by the Gardeners, to prune their *Vines* in *December*, which

Seaſon they hold to be much better than the Months of *January* and *February*; for the *Vines* prun'd in thoſe Months, are apt to bleed away too much of their Strength; and it is as common among them to leave four Buds or Eyes upon every prun'd Branch, whether they are ſtrong or weak Shoots: I have, I muſt confeſs, ſeen *Vines* that have been ſo order'd, produce good Fruit; but I am aſſur'd, whoever was to ſee the Vines which are now in Mr. *Fairchild*'s Garden at *Hoxton*, would go another way to Work. It is his Method to prune his *Vines* ſo ſoon as the Fruit is gather'd, and according to the Strength or Thickneſs of the Branch he leaves growing, he allows a due Length, a very ſtrong one, about a Yard long, and thoſe of leſs Vigour are prun'd ſhorter in Proportion: By this Method of Pruning, I obſerve he never fails of large Quantities of Grapes, ripening very well, and much earlier than any of the ſame kind prun'd after the uſual manner.

The *May* after this Pruning, our *Vines* muſt be again look'd over, and then disburden'd of the ſmall weak Shoots, rather by breaking them off, than cutting; and ſuch Shoots as have then Fruit appearing upon them, muſt be top'd ſo as to leave a ſufficient number of Buds above the Fruit upon each Branch, in proportion to its Strength or Thickneſs, obſerving always not to prune nearer to the Fruit than three or four Buds.

In *June* the *Vines* muſt be examin'd for the third Time; and the barren Branches, which will then be ſhot to a great Length, ſhould be prun'd to ſuch Lengths as anſwer to their Vigour, or elſe taken quite away, if they are not wanted, to furniſh ſome Vacancy on the Wall.

About the Beginning of *Auguſt* the Grapes of the forward Kinds will be full grown, and then we may again give a fourth Pruning, in order to expoſe the Fruit to the Sun for ripening; but yet let it not be left too naked of Leaves, leſt it be injur'd from the cold Dews which begin to fall the latter End of the Month.

In the Summer Prunings of *Vines*, due regard ought to be had to the Number of Branches, which the Wall will require to be laid in the Winter to ſupply the place of old Wood, which ſhould then be taken away; for it is a certain Rule, that no Branches of the *Vine* bear Fruit but ſuch as are the Produce of the laſt Year; and thoſe, if they are diſcreetly managed, ſeldom or never fail to furniſh Fruit in abundance.

Thus I have ſet down what I know concerning the Management of *Vines* againſt Walls, and ſhall now proceed to offer ſome few Hints concerning the Way of ordering them in *Vineyards* for the making of Wine, which I am ſatisfied may turn to as good Account in *England*, as they are known to do in many Parts of *Germany*.

If a *Vine* will proſper upon a Chalk, as we are certain it will, how trifling would be the Expence to plant an Acre of ſuch Ground with *Vines* in ſome well-expos'd Place on the Declivity of a Hill: The yearly Income of ſuch Land can hardly be a Shilling, if it be ſtrictly Chalk; and the *Vines* may be rais'd, as I have directed, with very little Trouble; and then for the Charge of Planting, a Week's Work for a Man would more than do it, ſeeing there is no Neceſſity of Manuring the Ground: The whole Expence before they began to bear Fruit, which would be the third or fourth Year after Planting, could hardly amount to twenty Shillings; ſo that I ſee no room for any Objection upon that account: The chief thing will be to ſhew, upon reaſonable Grounds, that Plantations of this kind will produce ripe Fruit, and that, I think, may be made appear very plainly.

In the firſt Place plant only the forward Kinds of Grapes, which have often enough been experienced to ripen in open Borders, without the Help of a Wall; witneſs the Vines at a *French* Gardener's at the Back of *Swallow-Street*, *London*; thoſe at the Honourable ---- *Johnſon*'s, Eſq; at *Twittenham*; the *Vineyard* near *Bath*; that near *Greenwich*, and almoſt in every Nurſery.

2dly, The Chalk-hill, which I propoſe to be planted with *Vines*, will certainly reflect as much Heat upon the Fruit as any Wall whatever; and every one knows that the Cold in thoſe Parts of *Germany* where the *Rheniſh* Wines are made, is much more powerful than what we feel in *England*; ſo that ſince we need not be apprehenſive of too much Cold in the Winter, and may reaſonably expect as much, if not more, Warmth in the Summer, our *Vineyards* may certainly afford us as good Wine as what we receive from the *Rhine*, and ſome places in *France*, and conſequently turn the Owner to Account.

But that we may anſwer every Objection that may be made againſt planting of *Vineyards* in *England*, give me leave to recite what I have heard relating to the making of Liquors with unripe and ſour Fruits. In *Devonſhire* a Gentleman made a Veſſel of *Verjuice* of *Crab* or *Wilding-Apples*, which being placed in his Cellar among other Liquors, was not uſed 'till about three or four Years afterwards, and was then found to be ſo palatable and exceeding pleaſant, that he now prefers the Liquor made of ſuch wilding ſour Fruit (after it has had time to digeſt) rather than any *Cyder* of that Country: So I have known *Verjuice* made of half-ripe Grapes, that after two or three Years keeping in a Veſſel has become delicate Wine; and the *Rheniſh* Wines, when they are newly made, are ſo ſour, that they are not fit to drink, but after ſeveral Years ſtanding afford us that incomparable Liquor, which is call'd *Old Hoc*; and on the contrary ſweeter Liquors are apt to turn ſour by keeping, which is one Argument to prove that a continual Motion and Alteration of State of every created Atom, is requiſite to ſupport the Frame of Nature; and, as I conceive, was it poſſible that any one the leaſt Particle of Matter could be deſtroy'd or lie ſtill, all Life and Being muſt ceaſe; ſuch Dependency has the greateſt Bodies upon the ſmalleſt Beings, or the moſt inveterate Oppoſites upon one another. The skilful Chymiſt knows how to ſeparate the differing Parts ſubſiſting in Liquors from one another; the volatile Spirits from the more watery Parts, and thoſe from the more oily; ſo that we find every Liquor contains a Chain of certain Qualities; and Liquors are only differing, in that one has perhaps the Acid more prevailing, the other the Alkali, or either of thoſe Powers more or leſs predominant at certain Seaſons. The Sweet, when it prevails in any Liquor, is not without the Sour ſubſiſting in it, altho' it has not Power to appear 'till its oppoſite begins to decline, and ſo the Sour is not without the Rudiment of Sweet, altho' it cannot be diſcern'd 'till the Time of Ripeneſs approacheth. But I ſhall forbear advancing any farther at this time in ſo vaſt a Field, and proceed to the Buſineſs in hand; That our Chalk Hills, and thoſe that are accounted the moſt barren Mountains in *England* are very proper to plant *Vines* upon, and the higher the better; for 'tis obſervable that ſeveral *Vineyards* in one Country, planted with the ſame ſort of *Vines*, produce very different Wines; thoſe on the Tops of Hills much ſtronger and better than thoſe which lie lower; inſomuch that one Barrel of the Mountain Wine will ſell for much more than that growing in the Valleys; and ſo far as I can learn, the ſtrongeſt Wines are always the Produce of the higheſt Mountains.

To plant a *Vineyard*, let the Place where each *Vine* is to ſtand, be open'd and prepar'd before any of the Plants are taken out of the Nurſery; let them ſtand a Yard aſunder in Lines, and the moſt proper Seaſon for their planting is in the firſt open Weather in *February*. It is uſual to prune theſe *Vines* according to their Strength the *September* before tranſplanting, leaving not more than four Buds on the ſtrongeſt, and then they will require no other Care the firſt Summer but to keep them clear from Weeds; about the End of *September* after planting, ſhorten the Shoots of that Summer according to their Strength, and the Summer following the ſtrongeſt of them will begin to ſhew a little Fruit; this ſecond Year the breaking of the ſmall Shoots and ſuperfluous Branches ſhould be carefully done in *May* and *June*, and two or three Shoots only maintain'd on each Vine, according to its Strength, and thoſe not to be ſhorten'd till the *September* following; theſe ſhould be ſupported by Stakes or Poles, ſo that they may not run cloſe to the Ground, but about a foot above it, leſt too much Wet ſpoil and rot the Fruit; for the nearer the Ground the Grapes grow, if they do not touch it, the riper and ſweeter they will be, and the ſtronger the Wine. In a word, continue from time to time this Method, to preſerve young ſtrong Shoots every Year to bear the following Summer, in Proportion to the Strength of every Vine, cutting away all the old ones, which (were they to remain) would only rob the Plants of their Strength.

But if notwithſtanding all the Care of pruning and weeding the *Vineyard*, the *Vines* are not inclin'd to produce large Bunches of Fruit, lay Ox's Blood or Carrion to their Roots about *November*, or, as it is very common in all the *Vineyards* abroad, manure them with humane Dung that has lain ſome time to meliorate and has loſt its Odour. This way of enriching Ground has very evidently the beſt Effect upon Fruit Trees of any other Manure whatever, but *Vines* chiefly, which will not bear any other.

With this Management, I doubt not that our *Vineyard* will produce good Store of Grapes in 5 or 6 Years after planting; and if the Owner ſhould be then diſpoſed to try what Wine they will produce, let him gather the Fruit when they are full ripe in dry Weather, if poſſible; then put them in the Fatt, and have them trodden by Men to preſs out the Juice without breaking the Stones; or where the Quantity of Grapes is not large, to preſs them with the Hands will do as well, and ſeems more cleanly: The Liquor thus preſs'd, ſhould ſtand in the Fatt about 15 Days with the Husks and Stalks in it to ferment if the Grapes were dry when they were gathered, otherwiſe not much above half that time before the Wine be drawn off, leſt it turn ſour, as it will be apt to do if the Grapes were gather'd wet. Some who are very curious in their Wine, pick off the damaged Grapes from the Stalks, before they make the Wine, which is ſo rich in its Flavour, that to compare it with the Wine made the common Way from the ſame *Vineyard*, it does not appear to be of the ſame Growth.

It is obſervable, that according to the Management of the *Vines*, the Wine is ſtronger or weaker: Thoſe *Vines* which have their liberty to run up high Trees, and are never pruned, afford the ſmalleſt Wines; others which are kept pruned, and have their Branches tied to Stakes about four foot high, make ſtronger Wine than the former; but the ſtrongeſt of all, is made of thoſe Grapes which grow near the Ground, as I have directed, and are ſometimes after gathering hung up to dry for three or four Days before they are preſs'd, which they ſay exhales the watery Parts.

SECT. II.

Of the FIG.

THE *Fig* delights in the ſame Soil with the *Vine*, and may be propagated either from Suckers or Layers, and alſo from Seeds. The Suckers are beſt ſeparated from the old Roots the Beginning of *March*, and ſhould then be tranſplanted without cutting any of their Tops; for this above all other Trees ſuffers moſt by Amputation, and indeed ſhould never be pruned if it could be avoided: The Layers ſhould be order'd like thoſe of the *Vine*, and the Seeds, as I have been inform'd, will readily come up if they are ſown in Rubbiſh, or ſuch like Soil, about *March*. It is moſt commonly practis'd in *England* to plant *Fig-trees* againſt Walls, becauſe it has been thought the Fruit would not otherwiſe ripen in our Climate, but that is a Miſtake; for in ſeveral Gardens about *London* I have ſeen them grow in Standards, and proſper and bear Fruit in more abundance, and much better, in my Opinion, than any I have yet ſeen againſt Walls; for as they are endanger'd by pruning, ſo they like as little the Confinement they are obliged to againſt Walls.

I have been told of a *Fig-tree* near *Windſor*, (that grows wild without Culture in an old Gravel-pit) which is ſo extreamly large, that many Buſhels of *Figs* are gathered yearly from it; and I know of ſome old *Fig-trees* that have been neglected for many Years, which bear more Fruit than any that I have ever ſeen dreſs'd and order'd in Gardens; and it is the common Practice abroad to plant them in certain Places of their *Vineyards*, and let them grow after their own Manner without any Interruption, ſo that with very little Difficulty this Tree may be cultivated. The only Art requir'd in its Management, is to preſerve the ſecond *Figs* during the Winter, that the ſevere Weather do not make them fall from the Tree, but that they may be maintain'd in Health to ripen early in the Summer. I remember to have ſeen at the late Biſhop of *London*'s Gardens at *Fulham*, ripe *Figs* in *May*, which were brought to that forward Perfection by keeping them in Pots, and ſheltring them all the Winter in a *Green-Houſe*.

Tho' with us we have not many Varieties of this kind of Fruit, yet are there as many Sorts of *Figs* as of any other Fruit, which in *Spain* and *Italy* are held in great Eſteem. The *White Figs* chiefly are valued by the Curious for their delicate Flavour, and early Ripening.

SECT. III.

Of the L'AZZAROLE.

THE *L'Azzarole* or *Neapolitan Medlar* is a kind of *Service*, producing very pleaſant Fruit, as I have heard from ſome curious Gentlemen who have eaten of it in *Italy*, where it grows frequently: Of late Years it has been brought into *England*, and cultivated in ſeveral Gardens, where I am inform'd it has produced Fruit; it boldly reſiſts the Severity of our Winters, and is well inclin'd to grow with us either in Standards or againſt Walls. I have propagated it three ſeveral Ways, by Budding it upon the *Hawthorn* in *July*, by Grafting in the Cleft in *March*, and by Inarching in *May*; ſo that the Admirers of this Fruit may be eaſily ſtock'd with it, if they are provided with a Nurſery of *Quickſet*. It loves a holding fat Soil.

SECT.

SECT. IV.

Of the MULBERRY.

WE have two Sorts of *Mulberry*, the *Black* and the *White*; the Firſt is the moſt common of *England*, a ſlow grower, and chiefly famous for its Fruit; and the *White Mulberry*, which grows extremely quick, has indeed a ſmall inſipid Fruit, but is no leſs deſerving than the other on account of its Leaves, which are the proper Food of the *Silkworm*.

The *Black Mulberry* is an Autumn Fruit, ſo tender when it is ripe, that it will not bear the moſt gentle Carriage without bruiſing; it is a Catkin-bearing Tree, producing Male and Female Bloſſoms at the ſame time, and it is noted by ſome, that it never buds till the Weather be ſettled warm; wherefore it has been laid down as a Rule, That *Orange-Trees* may be brought out of the Conſervatory, as ſoon as its Leaves are as large as a Crow Foot.

I do not remember ever to have ſeen this kind of Tree with a ſtrait Stem of any good height, or will the commom way of raiſing it, ever produce (in my Opinion) any better than I have ſeen; 'tis therefore I would adviſe that it be inoculated or grafted by approach upon Stocks of the *White Mulberry*, which naturally grows ſtrait, and will make a handſome Tree very quickly. I am well aſſur'd this would do much better than raiſing them by Layers, which is the common way, or from Seed, as ſome have practis'd.

The *White Mulberry* may be increas'd either by Seeds ſown in *March*, or laying the youngeſt Shoots into the Earth at that time. The Seeds will ſprout about three Weeks after ſowing, and be near ſix Inches high the firſt Summer, and the Layers will be fit to take off the Spring after they are laid into the Earth.

By either of theſe ways we may ſoon raiſe ſtore enough of young Plants to ſupply a large quantity of *Silk-Worms*; for which end the *Chineſes* ſow large Fields of this Sort of *Mulberry* to mow them down from time to time as they have occaſion; and the People of *Italy* plant Trees in the Roads, and every vacant corner of their Ground. I have heard of a Man near *Utrecht*, who has lately began the Trade of Silk, and the laſt Year, as I am inform'd from good Hands, made ten or twelve Bales of *Silk* from his own *Worms*: And, ſo far as I can underſtand, were Silk-worms more regarded in our Climate, they would do as well with us as they do in *Italy*, where they are ſubject to ſo many Hazards, but chiefly to be ſpoil'd by the violent Thunders frequent in thoſe Parts: No Man there is certain of a good Silk-Harveſt, till the Worms have actually ſpun their Silk; for if Thunders happen to come juſt when the Worms are going to ſpin, they will immediately drop, and infallibly periſh. It would be well to try whether the firing of Guns near ſuch Trees as are infeſted with Caterpillers, will not deſtroy thoſe Inſects.

CHAP. II.

Of Kernel-Fruit, ſuch as the APPLE, PEAR, MEDLAR, QUINCE.

SECT. I.

Of the APPLE-TREE.

THERE is no kind of Fruit better known in *England* than the *Apple*, or more generally cultivated. It is of that Uſe, that I hold it almoſt impoſſible for the *Engliſh* to live without it, whether it be employ'd for that excellent Drink we call *Cyder*, or for the many Dainties which are made of it in the Kitchen: In ſhort, were all other Fruits wanting to us, *Apples* would make us amends.

It may therefore be expected that I ſhould be the more particular concerning the Culture of this Tree, but conſidering how many have written of its Management, and how generally it is propagated with good Succeſs, I ſhall not enlarge upon it ſo much as otherwiſe I ſhould have done.

To ſet down the ſeveral various Names of *Apples*, would be a Work almoſt impoſſible, ſeeing how many various kinds are yearly produced from the Kernels in almoſt every County in *England*; and where they happen to prove good, either for making *Cyder* or Table-uſe, have Names given them according to the mind of the Perſon that rais'd them: However, as every Kind of *Apple* will not do well in *Eſpalier*, I cannot well avoid mentioning thoſe few ſorts which I have approv'd to be the moſt proper for Hedges, and the rather becauſe their Names are generally known to every Nurſery-Man about *London*. For that Uſe then, the *Codlin*, the *Non-pariel*, *Golden-Pippin*, *Kerton-Pippin*, and *Holland-Pippin*, ſeem to be the beſt: I have found theſe Kinds to bear plentifully, and produce Fruit upon their loweſt Branches; and I am perſuaded whoever delights in Gardens will not be without *Eſpaliers* of them, as well for the ſake of the great Quantity of Fruit they will produce, as for the Ornament they afford to a Garden, and the good Shelter they yield to all the under Race of Kitchen-Garden Plants which are encompaſs'd with them.

I have found this Good by encloſing the Quarters of a Kitchen-Garden with *Eſpaliers* of Fruit, that as they loſe their Leaves in the Winter, they then obſtruct none of the Sun's Rays from paſſing directly to the Herbs planted within them; and in the Summer, when they are cover'd with Leaves, they afford that Shade which is ſo requiſite for the good Growth of many Plants; and beſides theſe Conveniencies, being tied up to Poles, and kept in good Order, the very Borders they are planted in are as capable of receiving into them Herbs or Flowers, as if they were plain and open, and not any Trees planted on them.

The *Codlin*, which is the firſt of the *Apples* I have named for this Uſe, is propagated from Suckers taken from about the Roots either in *November* or *March*, and the other Sorts are increas'd by graffing upon *Crab-Stocks* in *March*: If they are deſign'd for tall Hedges, or if for Dwarfs, or for *Eſpaliers* of ſmall Heights, then upon *Paradiſe-Stocks*; the Soil which theſe and all other *Apples* ſeem to delight in, is a medium Earth between Sand and Clay, which they proſper in if it be freſh, rather than with a mixture of Dung among it.

I find, from Experience, that all *Kernel-Fruit* ſuffer greatly by Pruning, and it is by the unskilful Management of the Knife they ſo frequently are apt to canker, and ſometimes quite periſh; for my own part, that I may ſomewhat curb the uſe of the Knife, I chooſe to break off the Buds, which would produce luxuriant Branches, when they firſt appear, rather than leave them to be cut from the Trees when they are full grown, which is commonly when the Sap is at reſt. In *May* it is eaſy to diſcern what Buds are ſhooting for our Uſe, *i. e.* which will become Branches either to fill the vacancies of our Eſpaliers, or make Fruit-Branches; and it is at that time I disbud the Tree of the others which I eſteem uſeleſs, for then the Sap will heal the Wounds.

An ingenious Perſon who knows that the Shoots of *Apples*, *Pears*, and ſuch like *Kernel-Fruit*, will not bear till they are two Years old, will always contrive to lay in ſtore of Branches every Year into his Eſpaliers to ſucceed one another in Fruit-bearing; for the ſame Branches will produce Fruit but once, and when that is over (in Eſpaliers) they ſhould be taken away in proper Seaſon to make room for the others which are coming forward. Such Pruning indeed cannot be avoided on Eſpaliers, no more than taking away the Autumn Shoots; but the diſbudding them in *May* will prevent a great deal more, which otherwiſe there would be occaſion for; ſo that upon an Eſpalier well order'd, we ought to ſee Wood laid in of three Summers, the one with Fruit, others to knot for Bloſſoms, (which work Nature always contrives to do in the Bud, the Year before they bloſſom) and the third ſort new Shoots to follow in their turn; for Example, In *Auguſt* of this preſent Year, 1718, there ought to be upon our Eſpaliers about one third of the Branches with Fruit, one third of the Branches which have ſhot this Year, and the like proportion of Branches knotted to bloſſom the next Spring. About *Midſummer* is the beſt time to tie the Shoots of that Summer to the Eſpalier, and diſburden the Tree (eſpecially if it be weak) of its ſuperfluous Shoots; let the Branches be tied about four Inches apart at leaſt, for nearer than that Diſtance would be too cloſe; Hedges thus dreſs'd would not be ſubject to overbear themſelves, but give every Year a moderate proportion of Fruit large and good.

It is obſervable, that ſome of the Summer Kinds of *Apples* and *Pears* will produce Fruit upon the Branches that ſhot the Summer before, and upon ſuch Trees the Wood of two ſeveral Years may only be left; but the Winter-Fruits which ripen late, are always the Produce of older Wood.

Between Leaf and Leaf, the Gardeners commonly find their time to prune off all the Autumn Shoots, as well from their Standard-Trees, as from their Eſpaliers; and then diſburden them from ſuch Wood likewiſe as they judge unprofitable; but the Skilful have always this Rule before them, that the moſt weak Trees are firſt prun'd, and thoſe which are very luxuriant are left 'till *March*.

The Planting of *Apples* or *Pears* for Eſpaliers is beſt done at the Fall of the Leaf, leaving about ten or twelve Foot between Tree and Tree, and the Rails made of *Aſhen Poles* may be put up the following Summer.

For *Dwarf-Apples*, I believe every one will allow that thoſe grafted upon *Paradiſe-Stocks* are the beſt, I mean for their keeping in a ſmall Compaſs, and bearing abundance of Fruit with very little pruning: I have known them frequently cultivated in Pots, ſometimes ſo full of Fruit, that the *Apples* themſelves have weigh'd more than the Tree, and the Pot they grew in. At great Entertainment, how delightful would it be to ſet ſeveral ſorts of *Apples*, growing, upon the Table! It would be a kind of movable Orchard, which could ſeldom fail to bear good Fruit, as the Trees might be ſhifted from place to place, either to put them out of the way of Blaſts, or place them in the Shade for Improvement of the Growth of the Fruit, and in the Sun for the due ripening them.

Paradiſe-Stocks are raiſed with us by planting the Cuttings of them in *Autumn*; they ſtrike Root and grow freely, ſo as to be fit to graft on in two or three Years; they are brought originally from *France*, but now they are to be met with in almoſt every Nurſery about *London*; and for *Standard* and *Hedge-Apples*, *Crab-Stocks* taken out of the Woods, or *Seeding-Plants* of about three Years old, are the beſt.

There are two ways of Planting an Orchard; the one to make it entirely for Fruit, the other to plant the Trees at ſuch Diſtances as to admit of an Under-crop. I muſt confeſs, was I to make an Orchard to pleaſe my ſelf, I would firſt divide the Ground into Parcels, allowing handſome Walks between them, which ſhould ſome of them be fenced on the Sides with Eſpaliers of Fruit, others left open with Borders only on their Sides, adorn'd with Rows of *Standard-Apples*, ſuch as *Golden-Pippins*, *Golden-Renets*, *Ruſſet-Pippins*, *Kitchen-Renets*, *Pairmains*, *Green-Ruſſets*, and ſuch like ſerviceable Fruits that will remain good for ſeveral Months.

In theſe ſeveral Quarters plant your Trees at about ſixteen Foot diſtance, if you deſign a cloſe Orchard, or near thirty Foot aſunder if the Ground is deſign'd for *Beans*, *Peas*, or ſuch like Under-crops. In Planting this Ground for either Purpoſe, ſuppoſing it three Acres, let two Thirds at leaſt bear *Apples*, and the Remainder be allotted for *Pears*, *Plums*, *Cherries*, and a *Mulberry-*

Tree or two: The Ground thus planted may be fenced about with Hedges of *Philbuds* and *Berberries*, to make it ſtill the more compleat and delightful.

SECT. II.

Of the PEAR.

THE *Pear* in my Opinion is a Fruit no leſs pleaſant than the *Apple*, altho' it is not of that general Uſe, however we are beholding to it for no ſmall Entertainment in the Winter when other Fruits are ſcarce; whether we eat them raw, or baked, they have their Excellencies: The Varieties of *Pears* are almoſt without Number, if we were to joyn the ſeveral *French* Sorts to the Catalogue of thoſe rais'd in *England*; but as I ſuppoſe every one would rather propagate a few good Sorts that bear well, and follow one another in right Seaſon, than croud his Garden with uſeleſs and unprofitable Trees; I may therefore be excus'd inſerting a tedious Liſt of their Names, and give the deſir'd Satisfaction to my Reader, if I mention only thoſe Kinds that may bring him Profit and Pleaſure; and thoſe I ſhall ſet down as near as I can remember in the Order they ripen: The firſt ripe is the little *Muſcat*, and then I would recommend the *Katerine-Pear*, which is indeed a common Fruit, but is nevertheleſs of an agreeable Flavour; The *Windſor-Pear* likewiſe is in my Eſteem, tho' it is an *Engliſh* Fruit, well worth our propagating: About the ſame Time are ripe the *Quiſſe-Madam*, *Summer Bon-Chretian*, and *Summer-Bergamot*, and indifferently good, but eſpecially the latter; then the *Orange-Bergamot*, and the firſt *Bureé-du-Roy*, exceeding good; and after theſe the *Lemon-Pear*, *Bargamot*, *Grey-Bury*, *Virte-Longue*, *Green Sugar-Pear*, *Meſſire-Jean*, and *Cryſan*; then ripens the Winter *Thorn-Pears*, *Virgolue*, *Leſchaſſeries*, and I think alſo the *Sweet-William Pears*; ſome of which laſt continue part of *December*, in which Month the *St. Germain* and *Martinſec Pears* are alſo beginning to ripen, and will hold good all the *January* following, 'till the *Winter Bon-Chretians* ſupply their Place; all theſe are Eating-Pears; and for the Baking Kinds that are the beſt I know of, they are the *Wardens*, *Black-Pear* of *Worceſter*, and *Spaniſh Bon-Chretian*; theſe, if they have time enough to ſtand in the Oven, will bake extreamly tender, and very red; but particularly will be of a moſt beautiful Colour if they are baked in Tin or Pewter-Veſſels cloſe cover'd, as has been often experienced; but indeed 'tis no wonder if by this Means they are better colour'd than thoſe that are baked in Earthen-Ware, if we conſider that 'tis a Solution of Tin Oar that makes the ſo much admir'd *Beau-dye*; and I doubt not but if ſuch as dye Scarlets made uſe of Tin or Pewter-Veſſels, rather than Copper, it might ſave them ſomewhat in the Expence of *Cochineel*, or ſuch other chargeable Ingredients. *Pears* are either grafted in *March*, or inoculated towards the latter End of *June*; and two ſorts of Stocks are made uſe of for thoſe Purpoſes, Wildings or Kernel-Stocks; and oftentimes ſuch as are taken from about the Roots of old Trees, and planted in Nurſeries, are good for *Standard-Pears*, becauſe they put the Graft or Bud forward, and tend to make large Trees; but *Quince-Stocks* are much better for ſuch *Pears* as are deſign'd for Dwarfs, low Walls, or Eſpaliers, becauſe they confine the Growth of the Graft or Bud, and produce Fruit quickly, and near the Ground.

The Soil which the *Pear* chiefly delights in is a wet Earth inclining to Clay; nay, I have ſeen this kind of Tree proſper extreamly in the ſtrongeſt ſort of blue Clay, which is accounted the worſt of Soils; ſo that this Sort, no more than the Apple-Tree, delights in what we call rich Earth. If indeed one of this ſort of Trees ſeems to decay, encourage it at the Root with Carion, or the Blood of ſome Animal, for that has a wonderful Effect upon all kind of Fruit-Trees; and I believe would have the like upon every ſort of Vegetable, as we have experienced

Shavings of Horn, Scrips of Leather, Wool, or the Entrails of Fowl, or ſuch like Parts of Animals will have upon thoſe Plants, whoſe Roots they are laid to. It ſeems therefore as if the Animal and Vegetable were made for the Support and Food of each other; the Plants to nouriſh the living Animals, and the dead Animals to feed the Vegetables.

In the Pruning of *Pear-Trees* the ſame Method ought to be obſerv'd as for *Apples*; they delight not in a Knife, and eſpecially thoſe grafted upon *Quince-Stocks.* Upon the cutting off any large Branch (if it happen to be neceſſary) cover the Wound with a Mixture of Tar, Rozin and Pitch, immediately after the Amputation, which will prevent ill Diſtempers, which the Wound would otherways be apt to bring upon the Tree.

I am no Admirer of *Dwarf Pear-Trees* in a Garden, becauſe their Figure is commonly too much ſtuddy'd and confin'd to afford us a good Quantity of Fruit; for it is almoſt impoſſible to have both together in Perfection; and beſides they take up too much room. I remember a fine Seat near *London*, where about four Years ago the Gardens abounded in *Dwarf Pear-Trees*, which altho' they were prun'd with tolerable good Skill, never produced any Quantity of Fruit, 'till at length they were laid into Eſpaliers, and have born Fruit every

Summer ſince in great Plenty; and I believe there was not gain'd to the Garden leſs than half an Acre of Ground, by that Diſpoſition of them.

Let ſuch *Pears* as are planted againſt Walls be well ſecured from the *Eaſt*; for altho' the Fruit, in its Kind, be good and hardy, the Eaſtern Blaſts of the Spring coming upon it, thickens the Rind, and fills the Fruit full of Knots as hard as Stone.

The Eſpaliers for *Apples* and *Pears* ſhould be about ſix Foot high, that there may be room enough for the Fruit-bearing Branches to be laid into them. And we ought likewiſe to obſerve, that the *Summer-Pears*, *i.e.* ſuch as have their Fruits ripen upon the Trees, are the moſt proper for Eſpaliers, becauſe they are moſt ſubject to bear near the Root, which the *Winter Fruits* ſeldom or never do; ſo that it would be to little purpoſe to plant the *Bon-Chretian*, and ſuch like laſting Fruits, in Hedges, or againſt Walls, that are not at leaſt ten or twelve Foot high.

There is a Method, which has been experienced by ſome of my Friends, to tranſplant large Trees of Orchard Fruit. One of my Acquaintance had an Orchard of *Apple* and *Pear-Trees*, that had ſtood about twenty Years; the Trees were in good Health, and bore Fruit plentifully; he had occaſion to remove to another Eſtate, about a Mile from this *Orchard*, and reſolv'd to attempt the Removal of his Fruit-Trees with him, for which End he open'd Trenches about the Roots in *November*, and at the ſame time made Preparation to receive them into his new Garden, by making Holes big enough to admit of the Clods of Earth he deſign'd to tranſport with each Tree. Soon after the Froſts began to be violent enough for his Purpoſe, and ſo harden'd the Earth about the Roots, that with Leavers he rais'd his Trees out of the Ground, without breaking any of the Earth from them, and convey'd 'em upon Sledges to their ſeveral Stations in his new Garden, where they remain'd in the State they were brought, without cloſing any freſh Mold to their Roots till it began to thaw, and then he finiſh'd his Work by filling up the Trenches, and treading down the new Earth very cloſe.

About a Month after they were thus fix'd, he diſcreetly pruned off about one third of their Boughs, as near as he could gueſs, to anſwer the quantity of Roots they had loſt, and the following Summer had a good parcel of Fruit upon them. No leſs uſeful than this Method, would be the Removal of young Trees at *Midſummer*, which I believe would ſucceed very well, tho' I have not try'd it; for the laſt Summer Mr. *Furber*, a very ingenious Nurſery-Man at *Kenſington*, removed at that Seaſon ſeveral ſorts of *Ever-greens*, which are now growing, and in much better

Health than ſome others that he tranſplanted in the laſt *Autumn.* As I conceive the Sap of every Tree to be at reſt about *Midſummer*, their Tranſplantation may then be perform'd with as much reaſon, as the Removal of them at the common Seaſons uſ d for that Work; for they have then more time to ſtrengthen themſelves, and form their Roots before *Winter*, than thoſe planted at *Autumn*, and will undoubtedly be better prepar'd to make ſtrong Shoots than any Trees that are planted in the *Spring*; but whether thoſe Trees that ſhed their Leaves will fare as well by this Method as *Ever-greens*, may be try'd.

I ſhall now conclude this Section with acquainting my Reader, that ſuch Fruit as does not ripen upon the Trees, ſhould not be gather'd till *Michaelmas*, and then only in dry Weather, if poſſible, without bruiſing, and laid ſingly upon Shelves cover'd with dry Moſs, if it can be got, or for want of it, upon Wheat-ſtraw, giving it Air by opening the Windows of the *Fruitery* (or Room it is laid in) till the Froſts begin. Some choice *Pears*, which ripen late in the Year, may be yet preſerved by hanging them up by the Stalks to the Ceiling of the Room; and I have known ſome curious Perſons wrap them in Paper, and hang them up till they were fit to eat.

SECT. III.

Of the MEDLAR, and QUINCE-TREE.

THE *Medlar*, contrary to all other Fruits is not fit to eat till it is rotten or decay'd; and as it is then agreeable to ſome Palates, I ſhall therefore give the Culture of it. It delights in loomy, natural Soil, and requires little Sun. It is propagated by graffing it upon the *Hawthorn* in *March*, and is only fit for Standards, in the moſt remote Parts of the Garden.

The *Quince* is raiſed either from Layers, Cuttings, or Suckers taken from the Root; it is a natural Fruit which does not require graffing, and comes early to bear: The young Twigs may be laid into the Earth in *February*, or the Cuttings planted in *November* ſtrike Root without Difficulty. This Plant loves a moiſt Soil, and Shade, and the Fruit, in my Opinion, exceeds all others for baking.

CHAP. III.

Obſervations and Experiments relating to the Propagating and Culture of Stone-Fruit-Trees.

THE Fruits which may be comprehended under the Title of *Stone-Fruits*, are, *Peaches*, *Nectarines*, *Abricots*, *Plums*, *Cherries* and *Almonds*; all which (the *Cherries* excepted) are ſo nearly ally'd as to make, as it were, one Family. What Directions I ſhall lay down for their Management will rather be in general than in particular, ſeeing how impoſſible it is to know every particular Soil, or the Diſpoſition of every different Tree, which if they were known would require as many various Ways of ordering. Monſ. *de le Quintinye* has indeed given us a very elaborate Piece relating to *Fruit-Trees*, endeavouring to aſcertain the Method of pruning them, but how ſeldom do we meet with any Trees juſt in the ſame State of thoſe he mentions? And if by chance we do happen to find ſuch, how difficult is it to comprehend rightly his Meaning? I cannot therefore avoid giving all due Commendations to the Ingenious Mr. *Laurence*, who is the firſt, I know of, that has reduced thoſe Difficulties in the ordering of Fruit-Trees to plain Reaſon, and has given us ſuch uſeful Experiments, whoſe Conſequences may beſt lead us to the right way of Practice in this Point. To proceed then upon the foot of Reaſon and Experience, as far as my Capacity will permit, I ſhall begin with ſome Obſervations upon the Nurſery, whoſe Soil ſhould be inclining to Loam, a medium Soil between Sand and Clay, and not any ways enrich'd with Dung; for if the Nurſery be richer than the Garden, the Trees never thrive when they are tranſplanted; therefore always contrive to plant them from bad into good Ground. About *September* make your Plantation of Suckers taken from the Roots of the *Muſcle-Plum*, the *White Pear-Plum*, or the *Black Damask*, which are good to inoculate *Peaches* upon, but muſt not be budded till *July* in the ſecond Year after they have been planted in the Nurſery. I have obſerv'd that *Peaches* proſper moſt that are budded upon *Almond-Trees* raiſed from the Stones. *Almonds* are to be put in the Ground as ſoon as they are ripe, and in one Year's Growth may beſt be inoculated, for they are too apt to *Gum* when they are older.

Nectarines and *Abricots* may likewiſe be budded upon any one of the *Plum-Stocks* I have mention'd taken from thence, and will proſper much better than if they were inoculated upon the beſt ſorts of *Plums*.

The Stones of *Black-Cherries* ſhould be ſet or ſown in *Autumn*, to raiſe Stocks to graff all other Cherries upon; they ſhould be planted out the ſecond Year after they are come up in Lines, about two foot apart; and the like diſtance ſhould be preſerv'd between all other Stocks that are deſign'd to graff on.

Cherries proſper beſt if they are graffed, which is contrary to *Peaches* and *Nectarines*, that will rarely be made to thrive but by Inoculation; all theſe are ſubject to *Gum*, which *Kernel-Fruit-Trees* are not, but the *Peach-Trees* and *Abricots* ſuffer the moſt by it, and often loſe whole Arms by a Canker that always attends the *Gum*, which comes commonly by unſkilful pruning, but more eſpecially by cutting into the old Wood at the *Midſummer* Pruning; therefore at that Seaſon take off as few Shoots as poſſible near the old Wood, but nail up ſlightly as many as can conveniently be laid to the Wall, to be more regularly diſpoſed the *February* following, which is the beſt Seaſon for the capital Pruning of *Stone-Fruit-Trees*; then may every bearing Shoot be topp'd, or cut, to leave about ſix or eight Inches, according as they are ſtrong or weak, and all croſs-growing Branches, dead Wood, and the

Shoots of two or three Years old, muſt then be entirely cut out; for it is a certain Rule, That all *Stone-Fruit-Trees* only bear Fruit upon the Shoots of one Year old, which may be diſtinguiſh'd from barren Shoots, by being ſmaller and better ſupply'd with Buds. I would adviſe that a Mixture of *Tar*, *Pitch*, and *Bees-Wax*, be laid upon any capital Wound, or elſe that it be burnt with a hot Iron, to prevent *Gum* iſſuing from it.

I account Liſt of Cloth to be much better for the nailing of theſe Trees than Leather, which is apt to ſhrink by change of Weather, and bind too much the Shoots which are encompaſs'd by it: It is by ſuch Bindings that oftentimes good Branches are wounded, and by that Means periſh; and therefore it is good to let them have room enough allow'd for them to ſwell, without any Preſſure upon them. In *Holland*, and ſome Parts of *Flanders*, they have Frames of Wood, in the manner of *Eſpaliers*, ſet againſt their Walls, about four Inches diſtant from them, and the Reaſons the Gardeners there give for ſo doing is not (I think) unworthy our regard. In the firſt Place they ſay, that their Trees being four Inches diſtant from the Wall, the Fruit is not apt to be deſtroy'd or ſpoil'd by Virmin, nor bruis'd or grow miſhapen: They ſay farther, that the Wall reflects a Warmth to that ſide of the Fruit growing next to it, which has the ſame Effect as to the ripening of it, as if the Sun was to ſhine on both Sides of their Fruit, and ſo prevents that unequal Reliſh which is found oftentimes in one ſingle Fruit which grew cloſe to a Wall. To which they add, that in this Method the Trees need not be planted ſo cloſe to Walls, as to want a ſufficient quantity of Earth on every ſide of their Roots, which thoſe commonly planted in the ordinary way muſt do on that ſide next to the Wall; and alſo that the Twigs of the Trees being tied with *Baſt*, ſaves the Expence of *Nails* and Shreds, and will not be ſo ſubject to canker by too ſtrait binding. And if I may add one Reaſon more towards the recommending theſe Wall-Eſpaliers (if I may ſo call them) it ſhould be, that thoſe Poles, which run horizontally, may be ſo contrived as to ſerve for Shelter to the *Bloſſoms* and young *Fruit*, from thoſe *perpendicular Froſts*, which oftentimes are ſo injurious, as the Curious Mr. *Laurence* judiciouſly obſerves.

I have mention'd, among other Obſervations, in the Chapter of *Kernel-Fruits*, that the Eaſterly Winds commonly are apt, when they blow directly upon *Pear-Trees*, to ſpoil the Fruit, by filling it with ſtony Subſtances; and no leſs prejudicial are they to the Bloſſoms of every forward blowing Tree, if it lie in their way; therefore I cannot recommend the Planting of *Abricots* in ſuch Places, where the Eaſt-Winds may blow upon them; For I obſerve, that in *March* thoſe Winds are always moſt frequent; and if they happen to come without Wet, they are infallibly attended with Blaſts, as I ſhall endeavour to explain in another Place. I find that *Abricots*, planted againſt a Weſt Wall, where they are ſhelter'd from theſe murdering Winds of the Spring, ſeldom fail to produce good Store of Fruit; while on the other hand all others in different Expoſures often fail of Fruit, unleſs they have been guarded by artificial Shelters, ſuch as I have ſeen in the Right Honourable the Lord *Parker*'s Gardens, (I think) contrived by his Lordſhip; they are Matreſſes of Straw, fix'd in Frames of Wood, about four Foot wide, and ſeven or eight Foot high, which are made to remove at Pleaſure; ſo that they may always be ſo placed, as to interpoſe between the Wind and the Tree, without ſtifling the Bloſſoms, or beating them off as Mats commonly do.

In the Grafting, or Budding of *Stone-Fruit*, I have obſerv'd, that ſuch Trees as are inoculated near the Root of the Stock, are much more apt to ſhoot out unprofitable luxuriant Branches, than thoſe that are budded, or grafted, five or ſix Foot from the Root. I find the latter to make Fruit-Branches in ſuch plenty, that hardly any Barren-Shoots are found upon them, which ſeems to happen, for the ſame Reaſon I have mention'd elſewhere, that too great Plenty of Nouriſhment is ever a hindrance to the bringing forth of Increaſe, as well in *Animals* as in *Vegetables*; and that a Luxuriance of Growth in either, muſt always be checked to make them prolifick; ſo the length of Paſſage in theſe Standards, which the Sap takes in its Aſcenſion from the Root, thro' the *Plum-Stock*, before it reaches that Part where it is to alter its Property in the Bud of the *Peach*, muſt, I think, contribute to weaken it, and rob it of that Luxuriance which it would have had, if it had been permitted to puſh out Branches near the Root, where undoubtedly it was more ſtrong and vigorous.

The ſeveral Kinds of *Stone-Fruit* may have different Scituations and Expoſures; *Peaches* for Example, and *Nectarines*, with ſome forward *Cherries*, ſuch as the ſmall *May-Cherry*, and the *May-Duke*, with a forward *Plum* or two, ſhould have a South-Wall; and if the Wall happens to be very high, I would adviſe it to be planted double (*i. e.*) with Dwarfs and Standards, that it may the ſooner be cover'd,

Abricots, ſome choice *Pears*, and a few *Peaches*, may be the Furniture of a Weſt-Wall; and ſome forward *Grapes* (for they bloſſom when Blights are commonly paſt) with ſome *Plums* and *Duke-Cherries* againſt an Eaſt-Wall, and to the North-Aſpect we may ſet *Plums*, ſome *Winter-Pears*, *Carnation*, and *Morella-Cherries*, with ſome *Golden-Pippins*.

Plums will alſo do well in Standards; and all ſorts of *Cherries*, excepting the ſmall *May*, and the *May-Duke-Cherries*, proſper beſt when they have Liberty. *Almonds* likewiſe will bear very well in the open Ground; and the *Bruxelles Abricot*, whoſe Fruit is ſo excellent, will bear plentifully without the help of a Wall.

The *Peaches* which I moſt covet, are the *Nutmeg-Peaches*, for the ſake of their early ripening, the *Common-Minion*, *Milets-Minion*, the *White-Magdalen*, the *Old-Newington*, *Belgard*, the *Admirable*, and the *Catherine-Peach*, which comes late, and is a certain Bearer. Of *Nectarines*, the *Red-Roman*, and *Orange-Tawny Nectarine*. *Abricots*, the *Maſtuline*, or *Forward-Abricot*, the *Orange* and the *Turky-Abricots* for Walls; and for Standards, the true *Bruxelles*. *Plums*, the *Morocco*, *Imperial*, *Orleans*, *Muſcle*, the two *Perdrigons*, *Queen-Mother*, *Violet*, *Abricot*, *Damaſcene*, *Cloth of Gold*, *or Drap d'Or*, *Royal*, *Bonum Magnum*, and the *White-Pear Plum*; to which we might alſo add the *Damſon*, which in my Opinion is not without its good Qualities.

Cherries; the *Early* or *May-Cherry*; the *May-Duke*; the *Black*, *Red*, and *White-Heart-Cherries*; the *Carnation*, the *Morella*, the *Flemiſh-Cherry*, and the *Common-Black*;

and alſo the *Cluſter-Cherry*, well enough deſerves a Place in our Gardens for the Curioſity of its Fruit.

There has been ſeveral ways practiſed to forward the ripening of Fruit: The late Marquis of *Wharton* had a Glaſs-Caſe made on purpoſe for that End; and by the Help of Fire, againſt the Back of the Wall the Trees were nailed to, and under the Roots of the Trees, had ſeveral Kinds of Fruit very early. But of all the Inventions that I have yet ſeen, or heard of, the Contrivance of the Ingenious Mr. *John Millet*, Nurſery-Man at *North-End*, near *Fulham*, is to be preferr'd: I have ſeen in his Garden ripe *Cherries* in *February*; and *Abricots*, *Roſes*, and *Junquils*, above three Months before their natural Seaſon, and thoſe not in ſmall Quantities, but in as great Abundance as if they had been the Product of Nature alone; and this he does with the Aſſiſtance of Horſe-Dung, judging it to yield a more gentle Sweating Heat than Fire, and is therefore more natural to Plants.

CHAP.

CHAP. IV.

Of the GOOSBERRY, CURRANT, STRAWBERRY, RASBERRY, BERBERRY, *and* PHILBUD.

ALTHO' the Fruits, which I deſign to treat of in this Chapter, are ſo commonly known, that there is hardly any Garden without 'em; yet I am apt to believe, the right Method of Raiſing and Ordering them is not every where underſtood.

Of the *Goosberry* we have the following Kinds, which are chiefly worth our Notice, *viz.* the large *White-Dutch-Goosberry*, which produces an excellent Fruit for eating; the large *Amber-Goosberry*, which I think is better for Baking while they are Green, than to be kept 'till they are ripe; the *Walnut-Goosberry*, which exceeds all others for the Largneſs of its Fruit, which may be gather'd for Baking ſooner than any other; and the *Champain-Goosberry*, which is ripe at leaſt a Fortnight before any of the reſt; and beſides theſe, the *Black-Hairy Goosberry* is pleaſant enough. If I ſhould here enumerate all the other Sorts I have ſeen, it would be to little purpoſe, ſeeing every Year is likely to produce new Varieties from Seeds; and the Rules for the Culture of any one Sort will ſuffice for the reſt that are, or can be rais'd.

This Kind of Shrub may be propagated either by Seeds, Suckers, or Cuttings; the firſt may be ſown as ſoon as they are ripe, and will come up the Spring following: The Suckers ſhould be taken from about the Roots of old Trees when their Leaves are fallen, in open Weather, and tranſplanted in Nurſeries; and the Cuttings likewiſe will take Root, if they are planted in *September* or *October*. Theſe Plants require a ſtrong holding Soil, and may be tranſplanted in *October* with more Safety than in the Spring.

We have three Sorts of *Currants* very different from each other, *viz.* the *Large White Dutch-Currant*, the *Dutch Red-Currant*, and the *Black-Currant*: The firſt is an admirable Bearer, and will ſometimes produce Fruit as big as ſome ſort of *Grapes*, but I think are not ſo pleaſant to the Taſte as the *Red-Currants*. The Kind which bears the Black Fruit, for Variety ſake, as well as on Account of its great Virtue in Medicine, ſhould not be wanting in a Garden, tho' ſcarce one in twenty can like its Flavour: Theſe may be propagated like the *Goosberry*, and delight in the ſame kind of Soil. I have known a curious Man, when the Fruit has been juſt ripe, tie up ſome of the *Red Currant*-Buſhes in Mats, to preſerve the Fruit upon them 'till *Auguſt* or *September*, and ſometimes later in the Year, and it is practiſed by ſome to plant them againſt Walls to make the Fruit come larger; but I have never found them half ſo ſweet as the Standards.

Both the *Goosberry* and *Currant* ought to be kept free from old Wood, never leaving on the Plants any Shoots (if poſſible) that exceeds three Years Growth; for the largeſt Fruit is always found upon the youngeſt Branches: Theſe Fruits are ripe in *July*.

We have three ſorts of *Strawberries*; the *Scarlet*, the *Hautboy*, or *Great White-Strawberry*, and the *Wood-Strawberry*: The firſt is ripe much ſooner than either of the other, eſpecially if it has had the Benefit of a good Expoſure, and a light Soil, which always contributes to quicken Vegetation; however *Strawberries* delight not in any Ground ſo much as that which inclines to Clay: 'Tis in ſuch Land we can only expect their Fruit to be large, and in abundance; witneſs the great Profits which the Gardeners about *Hammerſmith* (where the Soil is proper for making of Bricks) draw yearly from their Plantations of this ſort of Fruit.

The *Great White-Strawberry* ripens next after the Scarlet; and laſt of all the *Wood-Strawberries*, which continue a long while, but chiefly if they be kept ſhaded after they begin to ripen.

As I know no place where *Strawberries* are ſo generally propagated as about *Hammerſmith*, ſo I ſhall preſcribe the ſame Rules for their Management, as are commonly practiſed by the Gardeners of that Place.

They provide a parcel of Horſe-Dung and Cole-Aſhes, well mix'd and incorporated together, and lay on a ſufficient Quantity of it upon their Land, to be dug or trench'd in *February*; then they lay up their Borders three Foot wide, and thereon plant the Slips, of whatever kind they ſee convenient, at about eight Inches apart; after which they ſet *Beans* for a Crop that Summer; for the *Strawberry-Plants* will not begin to bear Fruit to any purpoſe till the Year following, and even then not comparable to what they will produce the Year afterward, which is the third Year after Planting; 'tis then they have a full Crop, if extraordinary Drought does not hinder: But I ſhould have alſo added, after the laying up of the Beds, that at every five or ſix Foot diſtance, they plant *Roſes*, *Goosberries*, *Currants*, or *Sweet-Brier*, which turns to good Account at the Markets, beſides the Advantage of the Shade thoſe Plants give the *Strawberries*.

From a Piece of Ground thus planted, it is hardly to be imagined what Advantage ariſes to the Gardeners, if they are diligent to keep their Crop weeded, and well water'd, if the Seaſon of their Bloſſom be dry.

Early in the Spring they clean them, and fling Earth among them to ſtrengthen their Roots; and that the Ground may not lie too long idle, they plant *Savoy's* and *Cabbages* in the Alleys for the Winter. A Piece of *Scarlet Strawberries*, ſo ordered, will remain tolerable good for about five or ſix Years, but the *Hauboy* and *Wood Kinds*, ſhould be renewed once in three Years, always minding to get the *Wood-Strawberries* freſh from the Woods, and not make uſe of Slips from the Garden, for thoſe degenerate.

But there yet remains many Particulars relating to *Strawberries*, which are not practiſed by theſe Gardeners, as the ſtringing them, or pulling off their Runners in *July*, where the Roots are weak eſpecially, ſo as to leave all the Plants ſingle, which is practiſed by ſome to make the Fruit large.

Again, to make them bear Fruit in the *Autumn*, cut down the Leaves and Flower Stems juſt before the Bloſſoms open, and they will ſhoot out freſh, and bear ripe Fruit about *September*, as I have experienced.

Now if it is deſired to have ripe *Strawberries* in *March*, it may be done by Planting ſome ſtrong Roots in Pots, and putting them on a gentle hot Bed in *January*, giving them what Air may be convenient till they Bloſſom, and moderate Waterings at that time with Water a little warm'd: By theſe Inſtructions, and the Care of an ingenious Gardener, who will rightly defend them from Froſts, or too ſharp Winds, we may have them produce Fruit as I propoſe. I cannot conclude the Culture of this Plant, without mentioning, that I have made Plantations of them in *April* and *May* with good Succeſs; and the ſecond *June* afterwards I have gather'd very good Fruit from them.

The *Rasberry* is the next to be conſider'd: We have two Sorts of them, the *Red* and the *White*; the latter is the greater Rarity, but in my Opinion it is not of ſo good a Flavour as the *Red*: Theſe delight in ſuch Soil as agrees beſt with *Strawberries*, and are propagated by Slips taken from the Roots in *March*, for that is the beſt Seaſon to plant them in: Some Gardeners plant ſingle Lines of them, leaving the Diſtance of about a Foot between the Plants; others make Beds for them of three Foot wide, and plant three Rows in a Bed, both which Ways I find to ſucceed very well: The firſt *Summer* after Planting they will fling up ſome Suckers from the Roots, and put out ſome few Shoots from the old Stems that were left remaining when they were planted; but as thoſe Stems are never left above a Foot long when we plant them out, we cannot expect any Quantity of Fruit from them the firſt Year, nor indeed any vigorous Shoots from the Roots till the ſecond Year, ſo that it will be the third *Summer* after Planting before we muſt expect a full Crop, for the Fruit is always found upon the Shoots of the preceding Year. The chief Culture neceſſary for this Kind of Plant, is to keep them clean from Weeds in the *Spring*, and prune the Tops of the ſtrongeſt Shoots of the laſt Year to leave them about three Foot high; and that Work muſt be done in *March*; as alſo to cut away all dead and weak Branches. The *Rasberry* ripens in the beginning of *July*, and laſts till the End of the Month.

The *Berberry* is a pleaſant Shrub, bearing beautiful Branches of yellow Flowers in the *Spring*, and no leſs delightful Cluſters of red Berries towards the *Autumn*: The Fruit is of a ſharp Taſte when it is ripe, and ſeldom uſed any other way than in Sauces: I have been told, that the Leaves of the *Berberry*, when they are young and tender, may be dry'd to imitate the *Indian-Tea*, which they call *Bobea*; and indeed the Figure of the *Berberry*-Leaf is not unlike it. If any one of my Readers ſhall think it worth his while to make a Trial, he may do it after the following manner: Lay the Leaves freſh gather'd upon a Sieve, placed over a Veſſel of boiling Water till the Stream has ſoftned them; then ſpread them upon a Copper-Plate over a gentle Fire, and move them too and fro till they roll up, which is the Method they uſe for drying their *Tea* in *China*, as I have heard; but I would adviſe ſuch as intend to make the Experiment, not to be over haſty in drinking the Infuſion of ſuch Leaves, before ſome skilful Phyſician has firſt given his Advice. There are two Kinds of this Fruit, one without Seeds, and the other with Seeds; the firſt is ſo rare, that I have yet only ſeen it grow in the Gardens of my worthy Friend *Samuel Reynardſon*, Eſquire, at *Hillington*, among his numerous Collection of curious Plants; but the other is found frequent enough in moſt Gardens; the Plant loves a Loamy Soil, and is increaſed eaſily by Suckers from the Root, or Layers in the beginning of *March*.

The *Philbud* is order'd like the *Hazel*, mention'd in the firſt Part of this Treatiſe, but is allow'd place in our Gardens, on account of its thin Shell, which is the only Excellency it has more than the common *Hazel*, in my Opinion. This and the *Berberry* ſhould be planted in the moſt remote Parts of the *Kitchin-Garden*.

Fig. IIII

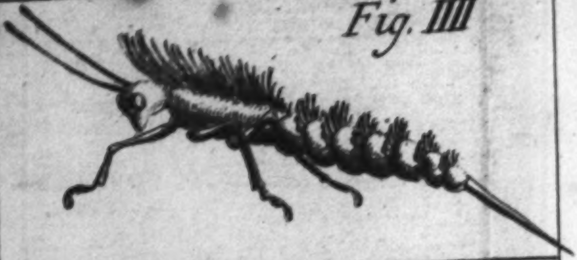


Fig. VI.

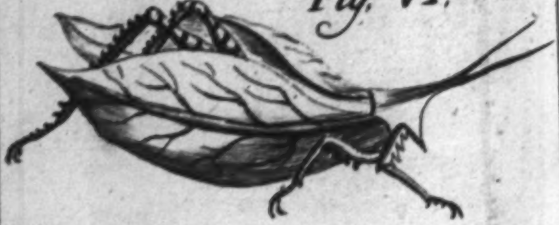


Fig. V.

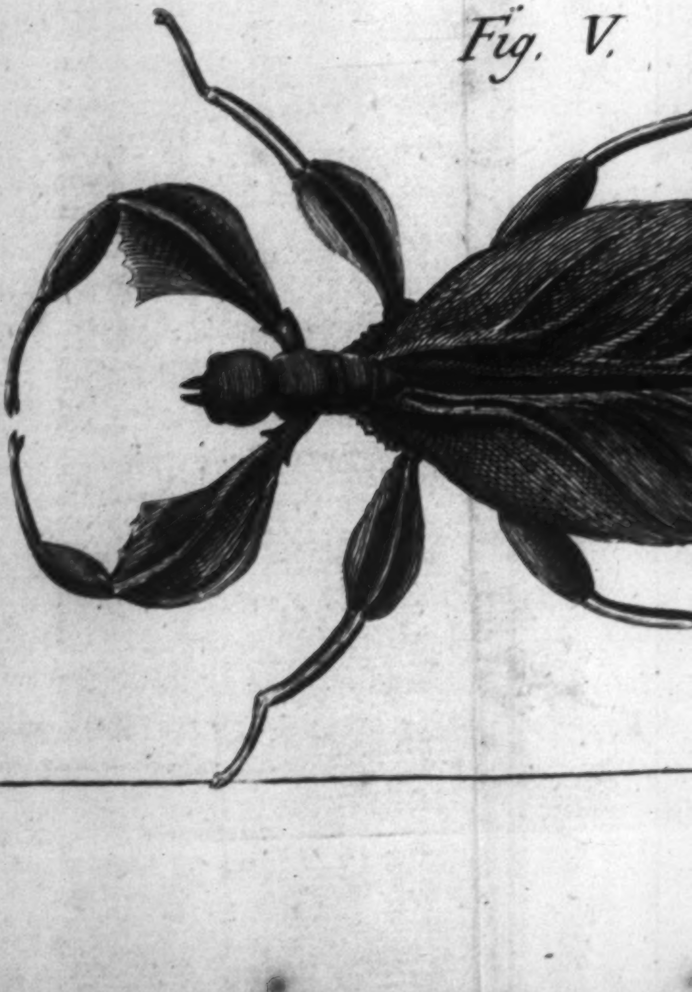


Plate. I. page. 53.

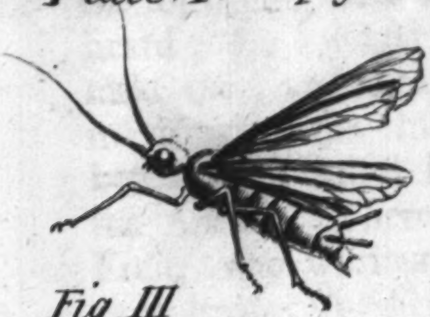


Fig III

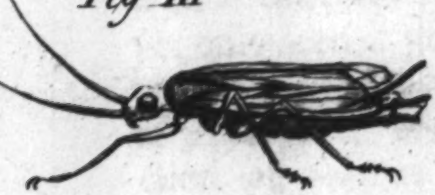


Fig. I

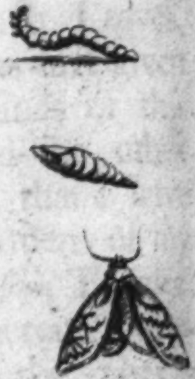
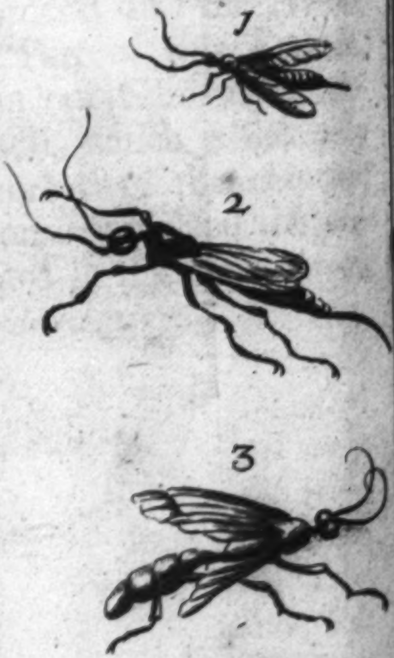


Fig. II.



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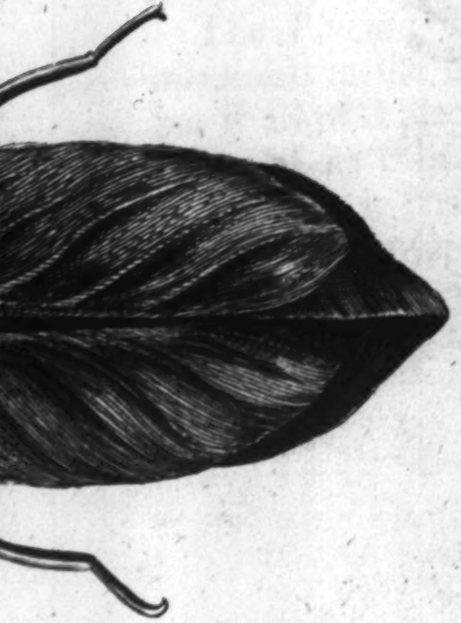

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CHAP. V.

Of BLIGHTS.

AS a *Blight* is the moſt common and dangerous Diſtemper that *Plants* are ſubject to, ſo I ſhall endeavour to explain by what Means *Vegetables* are affected by it; and if I ſhall be ſo happy from the Obſervations I have made, to diſcover the Cauſe of it, the Remedy may be then more eaſily found out, and the Gardener will with more certainty hope for Succeſs from his Care and Labour.

I ſhall be the more particular in diſcourſing upon this Subject, as it will afford me an Opportunity of opening to the View of my Reader a wonderful Scene of Nature, which hitherto has been ſlightly touch'd upon by Writers, or overlook'd, or deſpis'd by unthinking Men; and ſhall endeavour from the whole to draw ſuch Conſequences as may be both profitable and delightful.

Plants of all Degrees are ſubject to *Blights*, which are ſo variouſly communicated to them, that ſometimes a whole Tree will periſh by that Diſtemper; now and then a few Leaves or Bloſſoms only, and perhaps a Branch or two will be ſhrivel'd or ſcorch'd by it, and the reſt remain green and flouriſhing. I have yet never obſerv'd this Diſeaſe to happen among *Plants*, but upon the blowing of ſharp and clear *Eaſterly Winds*, which are moſt frequent in *England* about *March*; but ſometimes happen in other Months. It is very obſervable, that the *Caterpillars* generally attend theſe Winds, chiefly infecting ſome one Sort of Tree more than another, and even then not every where upon the Kind of Tree they attack, but ſome particular Branches only; from which Obſervations I think we may draw the following Inferences; either that the Eggs of thoſe *Inſects* are brought to us by the *Eaſterly Winds*, or that the Temperature of the Air, when the *Eaſterly Winds* blow, is neceſſary to hatch thoſe Creatures; ſuppoſing their Eggs were already laid upon thoſe infected Parts of the Trees the preceding Year.

The *Blights*, which are attended with large *Worms* or *Caterpillars*, ſeem to be rather hatch'd with the *Eaſt Wind*, than that the Eggs of thoſe Creatures are brought along with it; but thoſe *Blights* which produce only thoſe *Inſects* which occaſion the curling of the Leaves of Trees, may proceed from Swarms of them, either hatch'd, or in the Egg, which are brought with the Wind.

Some, perhaps, may object, that the *Eaſt Wind* is too cold to hatch theſe Creatures; how comes it then that we find them hatch'd when thoſe Winds reign? Or is it reaſonable to conjecture, that the ſame degree of Heat is neceſſary to enliven an *Inſect*, as is requir'd to hatch the Egg of a Pullet? The *Inſects* of *Norway*, *Iceland*, and ſuch like cold Climes, muſt certainly have leſs Heat to produce them, than Creatures of the ſame Race muſt neceſſarily have in thoſe Climates which lie nearer to the *Sun*. Every Creature, without doubt, requires a different Period of Heat or Cold to enliven it, and put it in Motion; which is prov'd by ſo many known Inſtances, that I conceive there is no room for any Diſpute upon that Score.

But there may yet be another Queſtion, *viz.* Whether it is not the *Eaſt Wind* of it ſelf that blights, without the help of *Inſects*? But that may be eaſily ſolv'd on my Side; for that if it was the Wind alone that blighted, then every *Plant* in its way muſt unavoidably be infected with its Poiſon; whereas we find the contrary, only a ſingle Branch it may be, or ſome other diſtinct Parts of *Plants*.

And again, to ſhew how reaſonably we may conjecture that 'tis *Inſects* which thus infect the Trees, let us only conſider, that every *Inſect* has its proper *Plant*, or Tribe of *Plants*, which it naturally requires for its Nouriſhment, and will feed upon no other

Kind whatſoever: Therefore it is no wonder to ſee one particular ſort of Tree blighted, when all others eſcape; as for example, that Wind which brings or hatches the *Caterpillars* upon the *Apple-Trees*, will not any way infect the *Pear*, *Plum*, or *Cherry* with *Blights*, becauſe were the Shoals of *Inſects* natural to the *Apple*, to light only upon thoſe other Trees mention'd, they would then want their proper Matrix to hatch in; or if they were hatch'd already, they would periſh for want of their natural Food; ſo that 'tis morally impoſſible that all ſorts of Trees ſhould be blighted at the ſame time, unleſs the Eggs of every Kind of *Inſect*, natural to each Tree, could be brought at one time with the Wind, or that an *Eaſterly Wind* could contain in it at once as many differing Periods of Cold or Heat, as would be requir'd to hatch and maintain each differing Kind of thoſe Creatures.

The common People in the Country ſeem to be of my Opinion, that *Blights* are brought by the *Eaſt Winds*, which they are ſo well ſatisfied brings or hatches the *Caterpillar*, that to prevent the too great Progreſs of *Blights*, it is common for them when the *Eaſt Winds* blow, to provide large Heaps of Weeds, Chaff, and other combuſtible Matter on the Wind Side of their Orchards, and ſet them on Fire, that the Smoak may poiſon either the *Inſects* or their Eggs, as they are paſs'd along. By this Contrivance I have often known large

Orchards preſerv'd, when the neighbouring Parts have ſuffer'd to the Loſs of all their Fruit.

And I have alſo ſeen theſe Fires made with good Succeſs to deſtroy the *Caterpillars* even after they were hatch'd, and had began to devour the Trees, by ſuffocating them, and forcing them to drop to the Ground, where they have been ſwept up in large Quantities and kill'd. I have heard it affirm'd, by a Gentleman of Reputation, that *Pepper-Duſt*, being powder'd upon the *Bloſſoms* of any Tree, will preſerve them from *Blights*; which may be, becauſe *Pepper* is ſaid to be preſent Death to every Creature but to Mankind. Now altho' this laſt Secret is too coſtly for common Uſe, yet it may be of Service in ſome particular Place for the Tryal of a new Tree, where a Taſte of the Fruit is deſired; and beſides, it helps to inform us, that *Blights* are occaſion'd by Inſects, or their Eggs, lodging upon a Plant, and that *Pepper-Duſt* will not ſuffer them either to live, or to be hatch'd.

Another Remark (which to me is Demonſtration) that *Blights* proceed from Inſects, or their Eggs (being brought with the *Eaſterly Winds*) was the total Deſtruction of the *Turnips* laſt *Winter*, on the *Weſt* Side of *London*; about *October* we had dry *Eaſterly-Winds* for a Week or ten Days, and ſeveral thouſand Acres of *Turnips*, which were then well grown, turn'd yellow and decay'd, unleſs in ſuch Places only as were ſhelter'd by Hedges, Houſes or Trees, where they remain'd green till the *Inſects*, which came with the Wind, in about a Week's Time deſtroy'd thoſe alſo. Some Farmers imagin'd that the Birds which were there in great Flocks, had eaten the Leaves of their *Turnips*, and contriv'd all Means poſſible to deſtroy them, 'till I convinc'd them that the Birds were rather Friends than Enemies, and came there to feed upon the *Caterpillars*, which were in ſuch great Numbers, that each *Turnip-Plant* had not leſs than a thouſand upon it; and that *Inſects* frequently paſs in Clouds and numberleſs Armies after this manner, is plain from ſeveral Inſtances, which have happen'd in my Time, and one of them the laſt *Summer* (I think in *June*;) one of theſe Swarms paſſing over *London* were ſuffocated, (I ſuppoſe) with the Smoak of the *Sea-Coal*, and dropp'd down in the Streets, inſomuch that a ſquare Court belonging to the *Royal-Society* was almoſt cover'd with them; theſe were of the *Fly Kind*, and fully perfected.

It may be ask'd, perhaps, how theſe *Inſects* came to deſtroy the *Turnips* only, and not touch the other *Greens* of the *Fields*, as *Cabbages*, *Carrots*, *Parſnips*, and the like? Every Herb has its peculiar *Inſect*, like the Trees I have mention'd; Nay, more than this, the *Inſects* which Nature has deſign'd to prey upon the *Flower* of a *Plant*, will not eat the *Leaves*, or any other Part of the ſame *Plant*. The *Leaves* of *Plants* have their *Inſects* natural to them, the *Bark* and *Wood* likewiſe have their reſpective Devourers; and thoſe ſeveral *Inſects* have other Kinds, which lay their Eggs, and feed upon them.

The Flowers of the *Province-Roſe*, before they are open, produce and nouriſh the Inſect, in Figure 1 of the firſt Plate, after the Eggs have been laid upon them. A. Is the *Nympha* or *Caterpillar*, which feeds upon the *Roſe-Buds*. B. The *Aurelia* of the ſame, which for a Time lies as it were in a State of Death, faſten'd with fine Silken Threads to the Leaves of the *Roſe-Tree*, and at length reſuſcitates and comes forth with Wings adorn'd with curious Variegations of Black and Yellow, C. and eats no more; while it lives in this laſt State, it ſeems to be the moſt perfect, by laying then its Eggs upon the Bark of the ſame Tree (about 100 in Number) after it has coupled with a Male of its own Tribe. This Proceſs from the Egg to the Fly, is by my Curious and Learned Friend Mr. *James Petiver*, F. R. S. made an Emblem of the Reſurrection; the *Nympha*, he obſerves, feeds and grows to a certain Degree of Perfection, as all Animals do; then for a Time is laid up without Motion in a State of Death, and appears at laſt in its utmoſt Perfection, with Wings beautifully adorn'd with pompous Colours, and breaths only the purer Parts of the Air.

The Leaves of Plants have alſo their Inſects. The *Silk-worm*, for Example, upon the *Mulberry*, the *Common White-Butterfly* upon the *Cabbage* and *Plants* of the ſame Tribe: And the *Bark* and *Wood* of Trees have alſo ſeveral Kinds of *Beetles*, which prey upon them, and are large enough to be diſcern'd without a *Microſcope*. There are yet other Kinds which are naturally diſpos'd to feed upon the Fruit of Trees, ſuch as we often find in *Apples*, *Pears*, and *Nuts*; and the Roots of Trees are alſo the proper Food for *Worms* of a different Race from thoſe already mentioned, ſuch as are long, ſcaly, and have many Feet; by ſome call'd *Canker-Worms*, which by devouring the Roots of Trees, cauſe them to languiſh for a Time, and at length die; and the very Pith of Plants is not ſafe from Enemies of this ſort; how often are the *Carnations* and other Flowers deſtroy'd by little Worms which eat their Pith?

And all theſe, if I miſtake not, have their *Icneumon Flies*, which feed upon them, and by the help of fine *Tubes* growing about them, convey their Eggs into the Bodies of the *Nymphæ* or *Caterpillars*, where they hatch as ſoon as the *Caterpillars* are laid up in *Aureliæ*, and feed upon them 'till they are themſelves perfected, and make their Way into the World; this I am ſure of in many Caſes, as I have often ſeen, when that Excellent Lady, the late Curious Ducheſs of *Beaufort* diverted her ſelf with enquiring into the Nature of *Inſects*, that the *Aureliæ* of ſeveral Months have brought only *Icneumon Flies* of different Kinds: See Fig. II. Plate I. N° 1, 2, 3. The firſt is the *Icneumon Fly*, bred upon the ſmall green *Caterpillar* which feeds upon the Red *Sallow*: The ſecond feeds upon that bred upon *Burage*; and the Third feeds upon the Inſect commonly found upon *Campion* or *Cockle*; and it may be theſe Inſects which prey upon others, are not without ſome others of leſſer Rank to feed upon them likewiſe, and ſo to Infinity; for that there are Beings ſubſiſting, which are not commonly viſible, may be eaſily demonſtrated, if there is any Truth in a *Microſcope*.

The laſt *Winter*, during the moſt ſevere cold Weather, a Friend of mine was deſirous to look into my *Microſcope*, and was ſo impatient that he would not allow me time enough to provide any new Subjects for the *Glaſſes*, but contented himſelf with examining ſome minute Parts of Plants, which had lain between the ſmall *Glaſſes* for above fourteen Months; among them he happen'd to pitch upon a ſmall *Hair* of the *Leaf* of the common *Mouſe-Ear*, when on a ſudden he diſcover'd a living Creature of the Figure of a *Beetle*, in appearance an Inch in Length, walking between the *Glaſſes*: He was much ſurpriz'd to find it ſo perfect in all its Parts, and gave me the *Glaſſes* that I might obſerve it, and delineate it for him; which I did, and by Computation found it to be more than one thouſand Times leſs than the leaſt Duſt of Sand viſible to the naked Eye. I was then willing to try whether the Cold, which was ſeverely felt by us, was not to that minute Creature equal to the Degree of Warmth, which hatches other Inſects of larger Size; and for that End I held the *Glaſs* about a Yard diſtance from a ſlow Fire about the tenth Part of a Minute; that trifling Heat to us, was ſo intenſe to it, that in that ſhort ſpace of Time, it was thereby burnt to Death, and ſhrivell'd to a fourth Part of its former Size, and ſcorch'd out of Shape; this brought to my mind the *Inſect* Mr. *Ray* mentions, which is hatch'd and dies in a Day, and alſo the ſeveral Periods of Life appointed to the ſeveral viſible Creatures upon Earth; and I could not help reflecting at the ſame time, that as I found, by the help of a *Microſcope*, that Quantity was only computed to be great or little in Proportion to what Objects our Eyes are capable of ſeeing without the help of *Glaſſes*; ſo I alſo imagined, that Space was confin'd to our Underſtanding by the ſame Rule; and that the

Life of that Creature, which lives only one Day, is of the ſame Length or Duration to it in Proportion to itſelf, as the Term of 100 Years is to Mankind; that is, about three Minutes of that *Inſect*'s Life is equal to a Year with us; and the coldeſt Air of the laſt *Winter*, to the Inſects I ſaw, was equal with the *Summer*'s Warmth to ſuch Animals as then only come abroad: For the Heat, which kill'd this *Inſect*, and was as a violent Fire to it, was hardly warm enough to be diſcern'd by me.

It is wonderful to conſider the Fineneſs of the ſeveral Parts of a Creature even ſo minute as this; (for the *Microſcope* has diſcover'd much ſmaller) how ſmall muſt the Organs of its Senſes be in Proportion to its Body! The Eyes, perhaps, a thouſand Times leſs, and the other Parts anſwerable to them; may we then not reaſonably conclude, that with ſuch Eyes it is capable of diſcerning other Bodies, which are as minute, and of as diſtant ſmallneſs to its ſelf, as the ſmalleſt Creature capable of our Sight is to us? For I think it is plain, that every Animal, as their Eyes are greater or ſmaller, or of different Make, have certain Bounds of Sight, beyond which they cannot ſee without help, ſuch as the *Microſcope*, *Teleſcope*, &c.

But alas! How trifling an Object was the *Inſect* I have mention'd in Compariſon to thoſe diſcover'd by Mr. *Lewenhoeck*, in a Quantity of *Pepper-Water*, no bigger than a Grain of *Millet*, in which he affirms to have ſeen above 10000 living Creatures, and ſome of his Friends at the ſame time witneſs to have ſeen 30000, and others above 45000 Creatures moving in that ſmall Quantity of Water? Nay, they tell us, that becauſe they would be within compaſs, they only related half the Number that they believ'd they had ſeen.

Now from the greateſt of the Numbers mention'd, it is inferr'd, that in a full Drop of Water there will be 8280000 of theſe *Animacula*, which if their Smallneſs comes to be compar'd, a Grain of Sand broken into 8000000 of equal Parts, one of thoſe Parts would not exceed the Bigneſs of one of theſe *Inſects*.

Theſe Obſervations of Mr. *Lewenhoeck*, were not only confirm'd by the Famous Mr. *Hook*, but were likewiſe improv'd by him: He tells us, that after he had diſcover'd vaſt Multitudes of thoſe *Animacula* deſcrib'd by Mr. *Lewenhoeck*, he made uſe of other Lights and Glaſſes, and magnified them to a very conſiderable Bigneſs, and that among them he diſcover'd many other Sorts much ſmaller than thoſe he firſt ſaw, ſome of which were ſo very minute, that Millions of Millions of them might be contain'd in one Drop of Water.

This indeed might exceed the Belief of thoſe who are not converſant with good *Microſcopes*; but I am ſatisfied, whoever once underſtands their Uſe, and make Tryal of thoſe made in our own Country by the late Mr. *Mellen*, or thoſe of Mr. *Wilſon* and Mr. *Marſhal*, will not want any Argument to convince them of the Truth of what is here related.

If then it is true, that there are Creatures of that exquiſite Smallneſs here mention'd, and that thoſe Creatures have Life and Motion, as it is evident they have, what muſt we then think of their Muſcles and other Parts, as Mr. *Hook* obſerves? Certain it is (*ſays he*) that the Mechaniſm by which Nature performs the Muſcular Motion is exceeding ſmall and curious; and to the Performance of every Muſcular Motion in large *Animals*, there are not fewer diſtinct Parts concern'd, than many Millions of Millions, which are viſible thro' a *Microſcope*.

Mr. *Lewenhoeck* has lately inform'd us, that upon a nice Examination of the *Ant*, he finds, that it is not wanting of any Part which is judged to be neceſſary and conducive to the Life and Motion of the largeſt *Animals*; and he farther adds, that the Filaments or little Threads which compoſe thoſe ſeveral Parts of the *Ant*, are as large as thoſe which do the ſame Office in an *Ox*, or any Creature of the largeſt Size, ſomewhat like *Silk*, which when it is firſt ſpun by the Worm, is all of one Fineneſs, but may be wove into the broadeſt Satin, as well as ſerve to compoſe the narroweſt Ribbon; the one, only taking a larger Quantity of thoſe fine Parts than the other. And indeed, ſo far as I have obſerv'd, it is the ſame in *Plants*; the *Oak*, the *Gourd*, and the meaneſt *Moſs*, are compo'd of Principles of the ſame Fineneſs.

This Account may ſuffice to ſhew us, that there are Beings ſubſiſting, which are not commonly viſible, and therefore it is eaſie to conceive, that the moſt gentle Air is capable of blowing them from Place to Place, and thro' their extraordinary Lightneſs it is as readily inferr'd, that they may thus be convey'd by the Winds to us from the moſt remote Quarters of the World, but more eſpecially from the *North-Eaſt* Parts, where the Cold is intenſe enough to give Life to theſe ſmall Creatures, and from whence there is not a Sea of a large Extent enough to deſtroy them while they are paſſing over it; for it is my Opinion, that the Vapour which naturally ariſes from the Sea, is much warmer than what generally is evaporated from the Earth, and conſequently inconſiſtent with the Life of thoſe minute Creatures, but chiefly thoſe Vapours which riſe from the main Sea, where the Land or freſh Waters are leaſt prevailing; and therefore, were thoſe *Inſects* to be blown to us from the *North-Weſt* Parts of *America*, I ſuppoſe the length of Sea they muſt then paſs over, would kill them before they came to us, and perhaps is the Reaſon why the Winds from thence are never known to blaſt any of our Trees, and are always much warmer than the *North-Eaſt* Winds, which come over a narrower Sea, which has many Rivers running into it. The *Orange-Tree*, in ſuch particular manner, delights in the warm Air of the Sea, that in the Inland Parts of *Italy* they will periſh by the Winter's Cold, if they are not houſed; and yet ſeveral Degrees more *Northerly*, where they grow near the Sea, they flouriſh, and defie the moſt rigorous Seaſon. It is obſervable, that the main Sea of it ſelf never freezeth (as ſome ſay) not even under the *Poles*, but only in ſuch Places where vaſt Rivers run into it; as in the *Sound*, and in *Hudſon*'s-*Bay*, where it is mix'd with freſh Water, the Froſt has Power over it. It ſeems reaſonable to believe alſo, that the Vapour which ariſeth from the Sea is deſtructive to *Inſects*, becauſe we find how much the *Salt*, taken from the Sea-Waters, contributes to the Preſervation of Bodies from *Putrifaction*, which I think is always attended with *Inſects*; and if the common *Salt* of the Sea-Water is ſo great a Preſervative againſt *Inſects* and *Putrifaction*, I ſee then no Reaſon why the Vapour ariſing from the ſame Fund of Water, ſhould not partake of the ſame Virtue.

The Receipt to prevent *Wheat* from being ſmutty (which is a Blight common to Corn) ſeems to confirm what I have ſaid; and I think we cannot enough commend that worthy Perſon (whoever it was) that ſo frankly communicated it, and ſo generouſly publiſh'd it for the common Good; happy would it be for the Nation, if every one would ſo generouſly contribute towards its Welfare.

The Receipt teaches us firſt to waſh the *Wheat* through three or four ſeveral Waters, ſtirring it round each time with a large Stick backwards and forwards with great Force, and with a Skimmer each time, take off all the light *Wheat:* When this is done, put your *Wheat* into a Liquor prepar'd in this manner.

Put into a large Tub, which hath a Tap, a ſufficient Quantity of Water; then put as much *Salt* into it, as when 'tis well ſtirr'd about, will make an Egg ſwim; then add as much more *Salt* as was before, and ſtir it very well, and to this put two or three Pounds of Allum beaten very fine, and ſtir it about.

This you are to uſe as you do your ordinary *Brines*, only you muſt let your *Wheat* ſteep thirty or forty Hours, for leſs ſignifies nothing; tho' the common Opinion is, that ſteeping ſo long kills the *Seed* in the *Wheat*; but Experience teaches the contrary.

You muſt take your *Wheat* out the Night before you ſow it, and ſift ſome ſlack'd *Lime* on it, which ſerves only to make it dry enough to ſow: 'Tis neceſſary to add ſome more Water to the *Brine* in a Week or Ten Days Time, as it waſtes, and *Salt* proportionable to the Water, and about a Pound of *Allum*.

Note, Many Farmers ſteep their *Wheat* in a *Brine*, yet have Plenty of *Smutty Wheat*, becauſe they don't make their *Brine* ſtrong enough, and take their *Wheat* out too ſoon.

Note alſo, Many Farmers have ſuffer'd greatly by *Smutty Wheat*, eſpecially in a dear Year, when ſuch *Wheat* will not ſell for above five or ſix Shillings a Buſhel; whereas that which is free from *Smut*, will ſell for ten, eleven, or twelve Shillings; and ſuch *Smutty Wheat* being eaten chiefly by the poorer People, and being unwholſome, occaſions Sickneſs; therefore for the Benefit of the Publick this is printed.

From hence we may learn how much *Salt* contributes to the Deſtruction of *Inſects*, which occaſion the *Smut* upon Corn; and it is not unlikely, that ſuch *Smut*, when it happens to be found upon Corn, may cauſe Sickneſs to ſuch as eat of it; for I am very apt to believe, that the moſt Epidemical Diſtempers Mankind is ſubject to, proceed from Poiſonous *Inſects*, which are either eaten unregarded, or are ſuck'd into the Stomach with the Breath, as that worthy Gentleman Mr. *Balle* ſo curiouſly obſerves, in a Letter I have receiv'd from him relating to infectious Diſtempers, which I ſhall annex to this Chapter, as it contains many Obſervations, which may help to explain and confirm what I ſhall offer concerning *Blights*.

I have already taken notice, that every diſtinct Part of a *Plant* has its *Inſect*, which is naturally diſpoſed to feed upon it, and thoſe all different from one another, as well in Shape as in Colour. It ſeems reaſonable enough alſo, that every *Inſect*, as it has a different Kind of Food, is of a different Virtue, perhaps partaking not only of the *Plants* they feed upon, but of the Qualities of each diſtinct Part of thoſe *Plants* which are their Food; for, as I have obſerv'd, that every *Plant* has Channels peculiar to the Conveyance of its ſeveral Juices, ſuch as thoſe minute Pipes in the Wood, which admit only the riſing Vapour from the Root; and thoſe other larger Paſſages between the inner Bark and the Wood, by which that Vapour returns when it is condenſed into a Water: And again, the different Sizes of thoſe Veſſels which make the *Parenchyma* of the ſeveral Barks, and reſpectively receive from the falling Sap ſuch Parts only as they are diſtinctly made to imbibe, not to mention thoſe other Veſſels of different Frame in the Leaves, Flowers, and Fruits of *Plants*, which can only admit of ſuch Particles of Sap, as they are all ſeparately appointed to receive; I ſay, from theſe Obſervations it appears, that every Part of a *Plant* has then its diſtinct Virtue from the reſt; and ſo the *Inſects* feeding upon each reſpective Part, muſt then be of differing Qualities from one another, and I conceive might be of greater Uſe in Medicine than the *Plants* themſelves, if they were once try'd; as the *Cantharides*, which are *Inſects* that I think feed upon the *Roſe-Tree*; the *Alkermes*, which are bred upon the *Shrub-Ilex*; and the *Cochineal*, which is an *Inſect* lately found in *Carolina* to feed upon the *Indian-Fig*, or *Prickly-Pear*; all which Creatures certainly contain the fineſt Spirits of the Plants they feed on.

I have often thought that it might be of ſome Uſe, if ſuch *Animals* as are commonly bred for the Food or Nouriſhment of Mankind, were ſometimes fed with particular Diet, ſo to alter the natural Vertue or Quality of their Fleſh; and eſpecially, if we were to practiſe upon ſuch as are frequently uſed in Medicine. The *Thruſhes* in *Italy*, which at one time of the Year feed upon *Myrtle-berries*, have then the Flavour of *Myrtle* in their Fleſh, and conſequently ſome of its Vertue at the ſame Time. So I doubt not but *Snails*, (which differ ſo much from what I call *Inſects*, that they will eat of almoſt any *Plant*) may be made to alter their

Vertues, by feeding them upon ſome particular Sort of *Plant* which we have a Mind to extract any certain Vertue from; but this I leave to be better conſider'd by thoſe whoſe proper Buſineſs it is.

Inſects infect *Plants* ſeveral ways, beſides actually devouring them; as for Example, the *Peach-Trees*, which ſo frequently have their Leaves curl'd up in the *Spring*, and are at that time cover'd with a kind of *Honey-Dew*, are then generally attended with great Numbers of *Ants* which reſort to them; but it is not from the *Ants*, as is commonly imagin'd, that this ſhriv'ling of the Leaves proceed; the *Ants* rather help the Tree than injure it; they come thither to feed upon certain little *Inſects* which harbour on the Back of the Leaves, wounding the *Parenchymous* Parts of them, from whence they ſuck the Juices of the *Plant*; and by that frequent wounding, cauſes ſo many *Eſcars*, that the Leaves cannot avoid curling, and becoming gummy. The *Inſects* I mention may be eaſily diſcern'd without Glaſſes, but being magnified with a common *Microſcope*, appear as large as the third Figure of the firſt Plate. *Plum-Trees* are ſometimes diſtemper'd in the ſame manner with *Inſects*, ſomewhat like thoſe upon the Leaves of the *Peach-Tree*; and the Bark of the tender Shoots of both thoſe Trees is frequently pinch'd by other ſmall *Inſects*; one of which I have

I have cut out of it, and magnified as in the fourth Figure, Plate I: its Back was cover'd with Briſtles, which grew the contrary way to thoſe commonly found in other Animals: Beſides theſe, ſome *Peach-Trees*, and the *Almond-Tree*, have their Leaves frequently bliſter'd and turn *Red*, without any appearance of *Inſects*; but if we examine them with a good *Microſcope*, we may eaſily perceive the *Parenchyma* of them to be fill'd with little white Worms; which according to the Nature of other *Inſects*, would in time come to have Wings, and I ſhould have likewiſe given a Figure of, if I had not miſlaid the Deſigns of them. Theſe *Inſects*, thus invading the young Shoots, will certainly deſtroy the Trees, if they are not carefully prun'd off as ſoon as they appear, as I conſtantly do whenever I ſee 'em: And I am inform'd, from a Perſon of Honour, that to prevent the Inſults of theſe or any other *Inſects*, he has known it practiſed, to bore a Hole with a ſmall Gimlet ſloaping downwards thro' the *Bark*, ſo as to reach the Wood of the Tree, and pouring into it ſome *Quickſilver*, about half an Ounce, or more, according to the Bigneſs of the Tree, and ſtopping it up, the *Inſects* then harbouring upon it will infallibly be deſtroy'd; but if the *Mercury* reach the *Pith*, the Tree will be endanger'd: And I cannot chuſe but be of his

Opinion, altho' I have not made the Experiment, becauſe I have been Witneſs of the Effect that *Crude Mercury* has had upon *Worms* in Humane Bodies, which anſwers to what my Author has ſaid of its Operation upon the like kind of Creatures in Trees: And if then by putting *Mercury* in one part of a Tree, the whole is ſo affected by it, as to deſtroy the *Inſects* feeding even upon its moſt remote Parts, I think there will be no Occaſion to diſpute the Circulation of *Sap* in *Plants*; but the *Inſects*, which prey upon the Juices of the *Oak*, and have their proper Matrices, or Beds for hatching in upon the ſeveral Parts of that Tree, yet produce other Effects than what I have hitherto mention'd. The *Oak-Berries*, which we find in *May* and *June* upon the *Leaves*, and ſometimes upon the Strings of *Male-Bloſſoms* or *Catkins*, are occaſion'd by a kind of *Fly*, not much unlike a *Flying Ant*, which bites the moſt ſpungy or parenchimous Part of the *Leaf*, or the tender Part of the *Catkins*, and lays its Egg in the Wound, which perhaps, by vertue of ſome Juice which the *Inſect* leaves at the ſame time, inclines the wounded Parts of the Tree to grow over the Egg, ſo as to encloſe it intirely, and make it ſwell 'till it is hatch'd and grown big, and ſtrong enough to eat its way out: I have ſeen of theſe *Oak-Berries* as big as large *Peas*; and when they are at their full Growth, are ſometimes, if they be expos'd to the *Sun*, of a browniſh red Colour.

There is another Kind of *Inſect*, which attacks the more rough Part, ſuch as the *Bark* that encloſes the Bole near the Root of the *Oak*: The Eggs of this are ſhut up in a kind of Berry, ſomewhat leſs than the former, but of a moſt beautiful Red Colour; they are commonly to be found in *May*, as I have obſerved in many Places in *Richmond-Park*. Beſides theſe, the *Oak-Apples* proceed from other Wounds made by *Inſects* of a different Kind in the *Bark* of the tender Twigs, in which they lay many Eggs, that turn afterward to Worms, as I have often ſeen: Theſe which they call *Apples*, no more than the *Oak-Berries*, are Fruits naturally deſign'd by Nature for the Tree; but in the manner I relate, are produced by Accident, where the ſeveral *Inſects* happen light.

It would be tireſome to relate all the ſeveral Ways that *Plants* are attack'd by *Inſects*; and indeed would be needleſs to do it, if I was capable, ſeeing that ſo far as we yet know concerning theſe things, two or three General Remedies put in uſe againſt thoſe Creatures, will ſuffice to hinder them from making any conſiderable Progreſs: The *Matraſſes of Straw*, which I have already mention'd, are good Guards againſt the *Eaſterly Winds*

Winds to ſhelter *Wall-Fruit*; and a good Fence of *Timber Trees* to the *Eaſt* of our *Orchard* will contribute to preſerve our *Standards* from the *Caterpillar*, which if they ſhould happen to come, may be deſtroy'd by the *Smoak* of *Wet-Straw* or *Weeds*; And in caſe our *Peach-Trees*, and ſuch like Kinds of Fruit, ſhould be unfortunate enough to be invaded by thoſe ſmall *Inſects* I have deſcrib'd, the pruning off thoſe Leaves or Twigs, as I have already hinted, is a ſure way to free us from them, as I doubt not would be the Uſe of *Quick-ſilver*, as I have directed. In the Time of the *Great Plague* in *London*, it was propounded to have large Quantities of *Onions* expos'd in Boats upon the *Thames*, which was to have been continually bruis'd, chop'd and moved about, which it was imagin'd would abate the Infection, ſuppoſing the *Plague* to proceed from innumerable Armies of minute unwholſome *Inſects*, which were then floating in the Air, and drawn in with the Breath: If this Propoſal could have had the deſired Effect, then I think we might, by the ſame Rule, deſtroy the *Inſects* upon Trees, by waſhing the Leaves with Water wherein *Onions* had been bruiſed and ſteep'd, or by laying ſome bruis'd *Onions* under our Trees that are the moſt aſſaulted by *Inſects*.

There remains yet one thing relating to *Inſects*, and their Manner of infecting of

Plants, which is ſo curious, and I believe ſo little known, that I cannot well avoid mentioning it; and that is concerning the *Folium-Ambulans*, or *Walking-Leaf*; two Kinds of it I have delineated, Fig. IV. and V. in the firſt Plate, from the *Inſects* themſelves, now in the Cabinets of the excellently Learned Sir *Hans Sloane*, Bart. of that indefatigable and curious Naturaliſt Mr. *James Petiver*, and in theſe celebrated Collections of Curioſity in *Holland*, belonging to the Famous Mr. *Vincent* of *Harlem*, and Dr. *Frederic Ruyſh* of *Amſterdam*, all of theſe Gentlemen, ſhining Ornaments of our *Royal Society*.

Both the wonderful *Inſects* I mention are brought us from *Amboyna*, where there are many different Species of them, and as I am inform'd, are produc'd in the following manner: The *Inſect*, when it has found its proper Tree of Nouriſhment, lays its Eggs ſeparately in the Buds of it, which hatches when the Buds begin to ſhoot; the *Inſect* then is nouriſh'd by the Juices of the Tree, and grows together with the Leaves 'till all its Body is perfected; and at the Fall of the Leaf, drops from the Tree with the Leaves growing to its Body like Wings, and then walks about; this is not common enough with us to be eaſily believ'd, and what I ſhould not have ventur'd to mention in this Place, if the *Inſects* themſelves were not to be met with in the curious Cabinets of our own Country.

What I account the moſt curious Point belonging to this Relation is, That the *Sap* of any Tree ſhould be ſo naturally adapted to maintain at once both *Vegetable* and *Animal* Life; and by that Means to unite the Parts of two Beings, ſo diſtinct from one another as *Plants* and *Animals*, and circulate the ſame Juices equally in the Veſſels of both. Indeed we have Inſtances enough to ſhew us how neceſſary the Juices of *Plants* are to the breeding up of ſome *Inſects*, and even to confirm that ſome Kinds of *Inſects* cannot be brought to live without their Eggs are properly lodg'd in, and entirely invelop'd with ſome certain Parts of *Plants*; as thoſe *Inſects*, for Example, which Nature has allotted for the Leaves of the *Oak*, and which make the *Oak-Berries*; but that a *Leaf* of a *Plant* ſhould ſo unite it ſelf with an *Inſect*, as to make one diſtinct living Body, is wonderful.

The Curious Mr. *Vincent*, above-mention'd, once ſhew'd me the Picture of a Branch of the Tree which the *Inſect* Fig. IV. grew upon, in which was painted theſe ſtrange Creatures of ſeveral Sizes, adhering to the Tree in the manner I have related: The Head and ſmall Parts of the Legs were of a light brown Colour; and the Wings and other Parts were of the Colour of the common *Bay-Leaf*; which Colours the *Inſect* retains even after it has been dead ſeveral Years.

The other of this Kind, Fig. V. has Wings of the Figure and Size of the Leaves of the *Spaniſh Broad-leav'd Myrtle*; but all its Parts, when I ſaw it, were of a *Feullemort* Colour.

Now as every *Plant* growing upon the Land is ſubject to be infected by *Inſects*, ſo the *Plants* of the Waters are alſo annoy'd by living Creatures that prey upon them. All ſorts of *Gnats* lay their Eggs upon the Waters; and ſo ſoon as they are hatch'd, and poſſeſs that Degree of Life anſwerable to *Caterpillars*, we ſee them friſking about in the Water for a Time, commonly making their Motions in the Figure of an S. Theſe *Nymphæ*, like Land *Inſects*, lay themſelves up at their appointed time, and from that State reſuſcitate and fly away in Groops: Theſe Kinds are bred in ſtagnated Water about *July*. The *Boat-Flies*, as they call them, and ſeveral other kinds of *Water-Inſects*, all have their reſpective Plants to feed on, and breed upon them (ſo far as I yet find) ſomewhat after the manner of Land *Inſects*; It would take too much time to relate the ſeveral Particularities found in ſome of them, contrary to other living Creatures, or to deſcribe their ſeveral various Forms, which would be of little uſe to my preſent Purpoſe; I ſhall therefore now ſubmit theſe Obſervations concerning *Blights* to the Cenſure of my Reader, and conclude with that curious Letter relating to *Plagues* and other Epidemical Diſtempers.

To Mr. BRADLEY, *&c.*

SIR,

UPON diſcourſing with you ſome time ſince about *Blights* upon *Trees*, you ſeem'd to be of Opinion that they were the Effect of *Inſects* brought in vaſt Armies by the *Eaſterly Winds*, and by lodging upon the *Plants* proper for their *Nouriſhment*, they there produced that *Diſtemper* which is call'd a *Blight* or *Blaſt*.

You was then deſirous of what Obſervations I had made concerning *Peſtilential Diſtempers* ſubject to Mankind, which I believ'd to proceed from the ſame Cauſe that produced *Blights*, *i. e.* from *Inſects*; I have therefore, in anſwer to your Requeſt, endeavour'd to recollect what I have from time to time obſerv'd relating to that Caſe.

To pretend to give a natural Reaſon for *Plagues* or *Peſtilences* that happen in the World, may be thought by ſome to enter too far into the Secrets of the *Almighty*. *Plagues*, as commonly argued, proceeding from, or being the immediate *Finger* of *God*, without the Concurrence of *Nature*;

that they are ſent down from him immediately for the Puniſhment of ſinful Nations, as in ſeveral Caſes mention'd in *Holy Writ*; and doubtleſs ſuch Judgments on Criminals, muſt have often been, and may yet be, to the End of the World.

But however the All-wiſe *God*, it may be ſaid, ſeldom in any thing acts contrary to thoſe Laws of *Nature* which he has inſtituted, rarely working by Violence what may be done by natural Means: So that in this Caſe, ſetting aſide Miracles, and what the *Almighty* can do, if he pleaſeth, by his own Power, my Endeavours will be to find out by what natural Means *Providence* may work to bring that terrible Judgment of *Plague* or *Peſtilence* upon any Country.

It is the common receiv'd Opinion, that the *Plague* proceeds from an Infection in the Air, and ſo undoubtedly it does; but then it will be ask'd, why the Air is not at all times thus infected?

Some will have it from *Steams* or *Vapours* ariſing from ſome *poiſonous Minerals* at certain bad Seaſons, which being by us taken into our Bodies with the Air, ferments and corrupts the Humours of the Blood, and our moſt dilicate Parts, and at length extinguiſheth that Vital Fire in which our Life conſiſts.

But this can hardly be the true Cauſe, ſince few *Minerals* have ſuch mortal *Steams* conſtantly iſſuing from them; but at ſome times only, unleſs it be in the *Grotto del Cane* at *Baia* near *Naples*, and ſome other Places of the like kind.

This *Grotto* is a Hole dug into a Bank near the *Lake d'Averna*, whoſe Water is warm, continually bubbling or boiling up; this *Lake* is cover'd with a Green Scum, and never freezes, lying not far from the famous *Sulfo Terra*, where much *Brimſtone* is made, and where *Smoke* iſſues out of the Ground in many Places. The Entrance of the *Grotto* is hardly wider than a common Door, and not high enough to admit a tall Man without ſtooping, growing narrower towards a Point, a few Yards diſtant from the Mouth; at the Bottom 'tis very wet, almoſt ſtanding Water, with Stones lying in it, and the Sides are alſo moiſt abeut a Foot or two in a ſtrait Line above the Bottom, which is as high as the *Steam* riſes, and is known by putting in a lighted Torch into the *Grotto*, and lowering it by degrees, 'till the Flame comes below the Top of the *Steam*, and then goes out. The Torch thus extinguiſh'd, the *Smoke* which is then below the *Steam* cannot riſe above it, but ſlowly ſteals out of the Mouth of the *Grotto*, and then aſcending is diſpers'd: Nothing will burn in this *Steam*, nor any Creature either of the Land or Water live in it longer than it can hold its Breath; not even an *Inſect*, as I have experienc'd.

I ventur'd to put my Mouth below the Surface of this ſuffocating *Steam*, and ſucking in a little of it, I found it of a very ſtrong Scent, ſomewhat like *Sal Ormoniac*: It ſeemed to me, after two or three Trials, that 'twas the moſt like ſucking for Breath in a *Vacuum*, it wanted that Subſtance which we find in common Air, and is ſo neceſſary to maintain Life in any Creature.

The common Trial ſhewn to Strangers, is to tie the Legs of a Dog, and lay him on the Ground where this *Steam* riſes; he immediately falls into *Convulſions*, ſets his Eyes, and ſtruggles in the ſame manner as I have ſeen Creatures do in the *Air-Pump* when the Air is exhauſted. The Dog, when he is void of Motion, is quickly drawn out of the *Grotto*, ſome few Paces to the Side of the *Lake*, and his Noſe and Mouth thruſt in and rubb'd in the Mud and Water, by which means he ſoon begins to recover, and in a little time is ſo well, that he returns home with his Maſter.

The Man who ſhew'd us the *Grotto*, when he ſaw that I was going to put my Head into the *Steam*, proteſted againſt it; and when he could not prevail, went away; but I told him, if I ſuffer'd as the Dog had done, he ſhould make uſe of the ſame Remedy, and recover me in like manner; but I ſoon ſatisfied my Curioſity without receiving any Harm.

Somewhat like this, is what I ſuppoſe are call'd *Damps* in *Mines* in *Britain* and other Places, which come only at Times, and are not laſting: Theſe *Damps*, when they riſe, will not ſuffer any Light to burn, and ſoon ſuffocate the Workmen and kill them, if they are not preſently drawn up into the open Air: No other Means has yet been diſcover'd to recover them after ſuch Accidents, excepting a freſh *Turf* be cut and laid to their Mouths, which perhaps may be for the ſame reaſon, that the Mud being apply'd to the Noſe of the Dog, recovers him, after he is drawn out of the *Grotto*.

Upon the Town-Walls of *Leghorn*, and in other Places of *Tuſcany*, they have Holes made like large *Ovens* for the Preſervation of *Corn*; the *Conſervatories* are brick'd within ſide, and coil'd round with *Wiſps* or *Cables* of *Straw*: On their Tops, which are level with the Surface of the Earth, are placed large Stones, with a Hole cut in each of them, big enough to admit Men and Baskets to go down. Theſe Places, when they are fill'd with *Corn*, are cloſely ſtopp'd with Stone-Covers, and Earth flung over them; but hither ſuch *Corn* only is brought as is infeſted with *Weevels* or *Ferments*, beyond the Cure of turning them, when by the Help of this Method all living Creatures in it are deſtroy'd, and the moſt violent *Ferment* it can be ſubject to is ſtopp'd, the *Corn* is taken out and return'd to the Magazines. In *Sicily*, *Barbary*, and I think in all other hot Countries, this is the only way made uſe of to preſerve their *Corn* from ſpoiling by theſe Accidents, which it is never ſafe from after it is thraſh'd 'till it is uſed; and I ſuppoſe theſe *Conſervatories* would have the ſame Effect upon all other Seeds or Grain.

'Tis remarkable, that in and about *Genoua*, where vaſt Quantities of *Corn* are laid up, they have none of theſe Places for curing their diſtemper'd *Corn*, but are often conſtrain'd to ſend it to *Piſa* to be thus brought to it ſelf, there being no Earth near *Genoua* that will produce that Effect.

In my Time one of theſe *Conſervatories* being empty was left open, where ſome *French*-Men were playing at *Bowls*, and one of the *Bowls* falling into it, one of the Company was let down with Ropes to fetch it up, but he was no ſooner down but was ſuffocated to Death; and one of his Companions, who endeavour'd to get him out, was ſo ſenſibly touch'd with the noiſome Vapour of the Place, that before he could get half way he was forc'd to return; but this was accidental, and I ſuppoſe was ſomewhat like the *Damps* in *Mines*, which I have already taken notice of.

The poiſonous *Vapours* I have here mention'd are plainly more deſtructive to Animal Life than any others that have been known, in that they act much quicker upon the Spirits of Animal Bodies, than thoſe which are ſaid to occaſion the *Plague* or other *peſtilential Diſtempers:* And there is this difference likewiſe between them, that a Body poiſon'd by the firſt, will not communicate that Poiſon to another, as People infected by that *Vapour* which cauſeth the *Plague* are known to do; therefore I think it plain, that the moſt nauſeous *Vapour* of it ſelf will not cauſe any *Diſtemper* that is *Epidemical.*

It ſeems then that the *Plague* proceeds from ſome other Cauſe, and that I ſuppoſe to be *Inſects* of that extraordinary ſmallneſs, that they are not to be diſcern'd by the naked Eyes; they are ſo light that they float in the *Air*, and ſo are ſuck'd in with the Breath. Such *Inſects* not being among us commonly, but only when they are either brought to us from ſome remote Place by the *Wind*, or hatch'd or nouriſh'd by ſome Intemperance of *Air*, or from poiſonous *Vapours* riſing from *Bogs*, *Ponds*, *Ditches*, or ſome ſuch unwholſome Funds of ſtagnating Water.

Theſe *Inſects* are various, according to the Nature of the Water or Air they are bred in; their Eggs being firſt laid by ſome flying Animals, which are then hatch'd, and paſſing through the ſeveral Changes common to *Inſects*; at length take Wing, and being drawn in with the Breath, may perhaps be either kill'd in our Bodies, and cauſe a violent Ferment in the *Juices*, or elſe finding proper Nouriſhment, they breed in the *Lungs*, *Stomach*, or other Parts within us, and probably may occaſion thoſe Biles and Breakings-out in the tender Parts of the Body that are call'd *Plague-Sores*.

But theſe *Inſects* are ſome of them ſo extreamly ſmall, that they are only capable of being diſcern'd with good *Microſcopes*; and when they are wing'd, and ſo quite perfected, may perhaps in Swarms be carried from one Country to another by the Wind: It is *Inſects* of ſeveral Kinds and Colours, which cauſes the Surface of Waters to appear ſometimes *Green*, *Red*, or *Black*; which laſt Colour in Water is obſerv'd by the Herdſmen to poiſon the Cattle that drink of it; and they ſay cauſeth the *Murrain*, which is the *Plague* in Cattle, and is very infectious.

It has been obſerv'd that *Plagues*, and the moſt contagious Diſtempers, have commonly happen'd in thoſe Years when the *Eaſterly Winds* have more than ordinary prevail'd in the *Spring* and *Summer Seaſons*; then the Air comes to be infected, and rarely or never at other times. Theſe *Winds* we ſee bring *Caterpillars*, and many differing *Inſects* and

Flies, which meeting with Places fitly adapted to nouriſh them, they are there brought to their winged State, which I conceive is the ſame in the Inviſible Animals as in the Viſible; nor indeed is any Part of the Earth, or Waters, and it may be the pure Air it ſelf, free from the *Seeds* of Life: Nothing is out of Motion, or can be void of it, ſetting forth the Glory and Infinite Power and Wiſdom of the *Creator*, from whence theſe infinite Productions proceed; ſome for one uſe, ſome for another: What we call the Bad, are thoſe which at unſeaſonable times invade by Swarms the Bodies of living Creatures, to whom they are deſtructive, and cauſeth the *Murrain*, *Rot*, and ſuch like Mortal Diſeaſes.

Again, that the *Plague* proceeds from living Creatures brought by the *Eaſterly Winds* ſeems probable; for that ſuch *Peſtilences* are moſt malignant in the *Summer*, after the *Eaſt-Winds* of the Spring have blown, which paſſing over the greateſt Continent of the Earth bring theſe *Inſects* with it; but the contrary Effect has the *Weſt-Winds*, which come to us over the vaſt *Atlantick Ocean*, attended with great Rains. Theſe laſt *Winds* cure the *Plague* (it may be) by carrying back the Remainder of thoſe *peſtiferous Inſects* which yet ſurvive, to the Country from whence they came; and *Froſt* and *Snow* likewiſe ſtops the Infection perhaps by killing them, or laying them to ſleep 'till the next Seaſon, when they may be either brought back again by the *Eaſterly Winds*, or be enliven'd, or freſh Swarms hatch'd by the Temperature of *Air* ſuitable to them.

I have not yet found that any Winds, except the *Eaſt-Winds*, ſuch as paſs over *Tartary*, bring any Infection with them, nor have I ever heard of *Peſtilential Diſtempers* in any part of the World, unleſs in ſuch Places only where the *Tartarian Winds* reach; *Tartary* being a Country full of *Woods*, *Boggs* and *Fens*, it ſeems the moſt capable of producing theſe Creatures in abundance, which may be carry'd by the *Wind* to certain Places in ſearch after their Food, as are *Locuſts* and ſome certain *Birds*, which are known to paſs from one Country to another.

Diodorus Siculus, in his Hiſtorical Library, Book XII. p. 286. ſaith, "The "*Plague* broke out afreſh in *Athens*, when "they had been but lately freed from that "*Contagion*: It raged with that Violence, "that they loſt 4000 Foot-Soldiers, and "400 Horſe; and of others, Freemen and "Servants, above 10000. And now, be-"cauſe the Courſe of the Hiſtory may re-"quire a Declaration of the Cauſes of this "violent *Diſtemper*, it is neceſſary in this "place to ſet them forth.

" Abundance of Rain had fallen in the
" *Winter*, by reaſon whereof the Earth being
" over wet (eſpecially in low and hollow
" Grounds) the Water lay in the
" ſtanding Pools, which corrupting and putrifying
" by the Heat of the *Summer*, thence
" proceeded a Miſt of groſs ſtinking *Vapour*,
" which corrupted the *Air*; and beſides the
" Want of good Food much advanced the
" Progreſs of the Diſeaſe; for the Year before,
" the *Fruits*, by too much Rain, were
" crude and unwholſome.

" There was likewiſe a third Cauſe of
" this *Diſtemper*, which was this: The
" *Eteſian Winds* (*which I take to be the*
" Maiſtrali, *or* North-weſt Winds) blew
" not this *Summer*, by whoſe gentle Breezes
" the violent Heat of the *Air* was uſed to be
" allay'd at other times; ſo that the Heat
" being now more exceſſive, and the *Air* as
" it were inflam'd, Mens Bodies wanting
" the uſual Refreſhment, contracted an evil
" Habit, from whence aroſe *Burning Diſtempers*;
" and thence it was that many
" ſeized with this Diſeaſe caſt themſelves
" into *Pits* and *Wells.*"

I was not in *England* in 1666, when the *Plague* raged in *London*; but I have heard from ſome of thoſe that then were in the City, that the *Summer* was ſo dry, that hardly any Rains fell until *November*, which Drought muſt be occaſion'd by an unuſual Frequency of *Eaſterly Winds*.

Experience ſhews us how much *Inſects* delight in ſtinking Places, and that they increaſe much faſter in uncleanly Cities, ſuch as *London* was formerly, than in cleaner Places; but the City of *London* having been for the moſt part burnt the Year after the *Peſtilence*, its Streets were enlarg'd, many Drains were made, and good Laws put in Execution for keeping the City clean, and it has not had any *Plague* ever ſince.

It is remarkable, that when the *Plague* reign'd in *London*, *Buckler's-bury*, which ſtood in the very Heart of the City, was free from that *Diſtemper*; the Reaſon given for it is, that it was chiefly inhabited by *Druggiſts* and *Apothecaries*, the Scent of whoſe Druggs kept away the *Infection*; which according to my Notion were ſo unnatural to the peſtilential *Inſects*, that they were kill'd or driven away by the ſtrong Smell of ſome ſort of *Druggs*: The Smell of *Rhue*, and the Smoak of *Tobacco*, were preſcrib'd as Remedies againſt the *Infection*, but eſpecially *Tar* and *Pitch-Barrels*; and I have been inform'd by a Perſon of Credit, that the People of *Lime-Houſe* were not affected by it, nor ſome of the *Docks*, perhaps for the ſame Reaſon; ſo alſo the Uſe of *Sea-Coal* may now be one means to prevent the *Plague* in *London*.

The People of *Leghorn* obſerve, that at the End of every eighteen Years they are ſubject to an *Epidemical Diſtemper*; which if it be not the *Plague* is hardly to be diſtinguiſh'd from it. I was there in two of thoſe Years; the Second was in the Year 1685, and was much worſe than the Firſt: It began about the Beginning of *Summer*, with frequent *Eaſterly Winds* (ſuch as were not uſual) continuing to blow almoſt without Intermiſſion 'till towards *Winter*; much as *Diodorus Siculus* deſcribes the Year to have been when the Great *Plague* was at *Athens*, we wanted that *Summer* our *Maiſtrali*, or *North-Weſt Winds*, as we us'd to have, which are the *Trade-Winds* in all the hot Countries of the World following the Courſe of the *Sun*: About Nine or Ten in the Morning theſe Winds begin to blow, and laſt 'till Sun-ſet, when ſoon follow the Winds from the Shore, which blow 'till the next Day about Nine, and then the *Trade-Wind* re-takes its Courſe.

The firſt *Infection* began in Houſes near the Walls of the Town to the Landward, from whence the *Eaſt-Wind* blew, and by degrees crept towards the *Sea*; but the *Infection* did not touch ſuch Places which were inhabited by *Merchants* and *Shop-keepers*, who dealt in *Salt* and *pickled Fiſh*, *Pitch*, *Tar*, and ſuch like Commodities.

To the *Northward* of the Town, towards the Sea-Shore, lay very boggy ſtinking Ground: Theſe *Marſhes* commonly about

Autumn cauſe *Agues* and *Feavers*, which may be from vaſt Swarms of inviſible unwholſome *Inſects*, which riſe from thence at that Seaſon, but of a different *Poiſon* from thoſe which cauſe the *Plague*: So the like Places about *Civita Vecchia*, *Scandaroon*, and I may mention the *Iſle* of *Sheppy* likewiſe, ſeem to cauſe *Agues*. And it is obſervable, that from the Mouth of the River *Magra*, which divides *Tuſcany* from *Liguria*, along the Sea-Coaſt of *Italy*, as far as *Terracina*, is very unhealthy and ſubject to *Agues* and *Peſtilential Feavers*, being *Marſhy Ground*.

We may alſo obſerve, that in *Turky*, *Egypt* and *Barbary*, when the *Plague* rages, the *Franks*, the *Engliſh*, *&c.* are ſeldom infected with it, which ſeems to confirm my Opinion, that this Sickneſs proceeds from *Inſects*, who having their certain natural Nouriſhments reſpectively appointed them, do not in thoſe Places infect Strangers, who have differing Ways of eating and living from the Natives, and are of a contrary Nature of Body. It would be well worth enquiry, if the People of thoſe Nations, that were in ſtrange Countries in the Times of *Peſtilence*, were alſo free from *Infection*.

King *Charles* the II*d*, when he was told of the Sickneſs at *Leghorn*, ſaid, it muſt have been occaſion'd by the *New Fortifications* which were then building in thoſe

Marſhy Places : And it is very rational to believe, that turning up thoſe unwholſome *Muds*, and expoſing them to the *Sun*, did much increaſe the *Diſtemper*, by infecting the *Air*, and filling it with greater Supplies of poiſonous *Inſects.*

I cannot help taking notice likewiſe of the raging *Diſtemper* which was among the *Cows* about *London* two Years agon ; it was ſo violent and infectious, that if *one* had it, all others that came within Scent of her, or even eat where ſhe grazed, was ſurely infected ; it ſeized their *Heads*, and was attended with running at the *Noſe*, and a very nauſeous *Breath*, which kill'd them in three or four Days. The *Herdſmen* would not allow it to be the *Murrain*, nor could give any Account from whence it did proceed, or could find out any Remedy againſt it ; they only tell us the unuſual dry *Summer*, and the continued *Eaſt-Winds*, were the occaſion of it. This *Diſtemper* had been for two or three Years before it came to us, in *Lumbardy*, *Holland* and *Hambrough*, to the Loſs almoſt of all their *Cattle.* The *States* of *Holland* cauſed a *Medicine* to be publiſh'd for the Good of thoſe who had their *Cattle* thus diſtemper'd, but having been try'd here, 'twould not cure One in Seven, but rather increaſed the *Infection* by keeping the diſtemper'd *Cattle* longer alive (by ſome Days) than they would have been without it. 'Tis remarkable, that no *Oxen* had this Diſtemper, but only *Milch-Cows*, which were more tender than the *Males*. The *Herdſmen*, to keep their Cattle from the Infection, let them blood in the Tail, and rubb'd their Noſes and Chaps with *Tar*; and when any happen'd to die of it, they were burnt and buried deep under Ground. It began at *Iſlington*, ſpreading it ſelf over many Places in *Middleſex* and in *Eſſex*, but did not reach ſo far *Weſtward* from *London* as twenty Miles.

The moſt general Opinion concerning the Cauſe of this *Diſtemper* was, that the *Cattle* were firſt infected by drinking ſome unwholſome ſtanding Water, where 'tis probable ſome poiſonous *Inſects* were lodged and bred; the *Summer* having been extreamly dry, attended almoſt conſtantly with *Eaſterly Winds*, the Graſs almoſt burnt up, and the Herbs of the Gardens almoſt deſtroy'd by *Inſects*; but ſuch as they were (unfit for Table uſe) were given to the *Cattle*. There was likewiſe ſo great want of *Water*, that many were forced to drive their *Cows* five or ſix Miles to it.

The *Electuary*, publiſh'd upon this Occaſion by the *States* of *Holland*, was compos'd of moſt, if not all, the *Druggs* uſed in the moſt ſerviceable *Medicines* that were made uſe of againſt the *Plague* among Men; moſt of which Ingredients we know to be mortal to *Inſects*, as ſtrong-ſcented Roots and Herbs; but above all, *Aromatick Gums* and *Saps* of *Plants*; as *Rhue*, *Garlick*, *Pitch*, *Tar*, *Frankincenſe*, and *Olibanum*; but I believe, before all others, Extractions from the *Cedar*, nothing preſerving Bodies from Worms better than that. Theſe Ingredients are much uſed in *France* and *Italy* to prevent or deſtroy Infection, by burning them and ſmoaking ſuch Bodies. Letters, or any other things as are brought from infected Places, after they have made *Quarantine*, and are not ſuffer'd to come on Shore 'till they have undergone this Operation.

It is not againſt Experience, that *Inſects* can live and increaſe in Animal Bodies: How often do we find Men, Women and Children troubled with *Worms*? What Varieties of thoſe *Inſects* are often voided by them? And how ſhould that be, if they were not either ſuck'd into the Stomach with the Breath, or taken into it with ſome unwholſome Food? For they cannot breed in ſuch Bodies from nothing, without either their Eggs or themſelves are brought thither by ſome Accident: For if they were the natural Produce of Animal Bodies, they would then be alike common to all, which we know they are not.

I have been inform'd, that in the Year 1714, when this *Mortality* among the *Cows* was at its height, that towards the End of the *Summer* ſome Farmers bought in freſh Cattle, and turning them into the ſame Fields, where many *Cows* has died before, they took the Infection and died likewiſe; but the following Spring thoſe Fields were void of Infection; and the *Cows* that were put into them did very well; but what were then put into the *Cow-Houſes*, where the ſick *Cows* had been the Year before, were ſeiz'd with the *Diſtemper* and died; which ſeems to inform us, that it was the Effect of *Inſects*, which thro' the Warmth of thoſe Stalls were preſerv'd from the Severity of the *Winter*'s Froſts; but ſuch as were left in the open Fields, were deſtroy'd by the Cold. I have heard that a Woman about *Camberwell* cured ſix in ſeven of her *Cows*, by giving them once a Week an Infuſion of *Rhue* and *Ale-wort*.

But it may be ask'd, why theſe *infectious Diſtempers*, ſubject to *Men*, *Cattle* and *Plants*, are not univerſal? And why the *Plague* ſhould not be as well in *India*, *China*, the South Parts of *Africa* and *America*, as in theſe Parts of the World? (For I do not find it has ever been in thoſe Places.) This *Query* gives me a farther Opportunity to ſuggeſt, that *Inſects* are the Cauſe of it, and that they are brought with the *Eaſterly Winds*. In the firſt place, ſo far as I can learn, there is not naturally in *America* any one Kind of *Creature* or *Inſect* that is found in any other

Part of the World, and the *Plants* likewiſe are all different from thoſe of other Countries; alſo it is the ſame in *India*, *China*, &c. whoſe Products are quite different from what we find elſewhere. Suppoſing then that theſe peſtiferous *Inſects* are only the Produce of *Tartary*, let us conſider to what Parts of the World they may be carry'd from thence with the *Eaſterly Winds*; and whether *India*, *China*, the South of *Africa* and *America*, are not beyond their reach, or can reaſonably be affected by them.

Whoever conſiders the Diſpoſition of the Land and Water in the Globe, may thus account for the Paſſage of theſe *Inſects*, with an *Eaſterly Wind* from *Tartary*, to all the Parts of *Europe*, *Aſia-Minor*, *Paleſtine*, *Barbary*, and other *South* Coaſts of the *Mediterranean Sea*, whither, 'tis highly probable, they may come, without meeting any thing in their way to obſtruct their Courſe.

The beſt Maps do not lay down any *Mountains* of Note between *Tartary* and the places which have been ſubject to the *Plague*: The *Alps* run parallel with the Winds coming from *Tartary*, and therefore does not any way hinder their Paſſage: The *Mountains* of *Dalmatia* are not high enough to prevent the Paſſage; or if they were, the *Caſpian Sea* is ſufficiently large to let them paſs to the *South* Parts of *Europe*, the *Mediterra-*

nean Sea, and the *North* Coaſts of *Africa*, even to their moſt *Weſtern* Bounds.

Now it may be expected perhaps, by ſome, that theſe *Winds* ſhould yet continue their Progreſs as far as *America*; but as yet, ſo far as I can learn, theſe *Land Winds*, when they have blown with the greateſt Force, and have been of the longeſt Continuance, have not reach'd farther than about three hundred Leagues beyond the *Weſtern* Coaſts of *Europe*, which is a trifle in compariſon of the vaſt *Ocean* between *Us* and *America*: Beſides, it is my Opinion, that the Winds which blow over ſo vaſt a Tract of Land, as theſe *Tartarian* Winds muſt do, that I ſuppoſe convey and ſupport the peſtiferous *Inſects*, are of ſo different a Nature from the *Winds* coming from the *Ocean*, that 'tis likely thoſe Creatures which would ſubſiſt in the one, would be deſtroy'd by the other: So that if I am right in this Conjecture, *America* cannot be ſubject to the *Plague*.

Mount-Atlas, which is a vaſt Ridge of *Mountains*, running from the *Ocean* almoſt as far as *Egypt*, and are back'd with the Deſarts of *Libya*, may very likely obſtruct the Paſſage of theſe *Inſects* to the *South* of *Africa*; and for that reaſon perhaps, ſecure that Part of the World from *Plagues*. So likewiſe *Mount-Caucaſus*, or *Ararat*, which is one of the higheſt Ridge of *Mountains* in the World, running from *East* to *Weſt*, thro'

Perſia and *India*, may ſecure the *South* Parts of thoſe Countries from the *Plague*, by ſtopping the Paſſage of thoſe infectious Creatures, if any *Winds* from *Tartary* ſhould happen to blow them that way: And as *China* lies to the *Eaſt* of *Tartary*, ſo it muſt be *Weſterly Winds* which muſt infect that Country with the *Plague*, if it proceeds from what I imagine: But we do not yet find that *Weſterly Winds* are frequent in thoſe Parts; or if they are, we may be aſſured they cannot blow at the ſame time when the *Inſects* are hatch'd and carry'd the contrary way by the Wind from *Tartary*. We are inform'd, that upon the Coaſt of *China* the Winds are ſo regular, that from *October* to *March* they continually blow from the *North-Eaſt*, and from that Month to *October* the direct contrary Way.

I have now given you what Obſervations I have made concerning peſtilential *Diſtempers*, which I think may, in ſome meaſure, ſerve to confirm your Notion of *Blights*.

I am Your, &c.

ROBERT BALL.

OF THE

Kitchen Garden.

CHAP. I.

Of the HOT BED.

A *Hot Bed* is the common Help made uſe of by *Gardeners* to forward the Growth of a *Plant*, and force Vegetation, when the Seaſon of it ſelf is not warm enough. By this means (if it be managed with Skill) the hotteſt Climate of the World may be ſo nearly imitated, that Seeds of Plants brought from any Country between the *Tropics* may be made to flouriſh: In a word, it is both curious and uſeful.

In order therefore to have a right Underſtanding of the *Hot Bed*, let us conſider what Degree of Heat is required for the Growth of *Plants* we are to raiſe upon it; for Nature muſt be imitated as near as poſ ſible, and not forced or exceeded, if we hope for Succeſs in our Undertaking.

Heat and *Moiſture* are certainly the Rudiments of Vegetation; and therefore whoever would promote the Growth of a *Plant*, muſt contrive how to have them both in ſuch due Proportion, as that neither one nor the other exceeds thoſe Limits which Nature has allotted for the Growth of *Plants*. A dry *Heat* we find rather ſcorches and ſhrinks a Plant than makes it grow; and wet, if it is not quickly exhaled from the Root of a *Plant*, chills it, and often injures it paſt Recovery. A moderate Sweating *Heat* therefore is the moſt deſirable, ſuch as is rais'd by the Ferment of wet *Straw* or *Horſe-Litter*, which for a time will ſend forth from the Earth lying upon it, that gentle *Steam*, impregnated with Vegetative *Salts*, which we find contributes ſo much to the Growth of *Plants*, beſides the putting thoſe Juices into Motion which are lodg'd in the Root, and circulating them thro' the *Veſſels* of the *Plant*.

The *Steam* which I ſuppoſe to riſe from the *Root* into the *Wood-Veſſels* of *Plants* to furniſh them with *Sap*, Chap. I. Part I. of this Work, will indeed, of it ſelf, keep a *Plant* alive; but then at the ſame time the *Bark*, *Leaves*, and other *Spongy Parts* of a *Plant* (which encompaſſes the *Sap-Veſſels*) if they are over dry, will ſhrink and pinch thoſe *Veſſels* ſo very cloſe, that they then cannot admit the *Sap* to *circulate* thro' them in ſuch Quantity as is neceſſary to ſupport the Plant in Vigour; on the contrary, when the *parenchimous* or *ſpongy Parts* of *Plants* are kept moiſt by the *aſcending Vapours*, which continually riſe round about them from the *Earth*, then the *Sap-Veſſels* are alſo more open, and at liberty to receive the Nouriſhment riſing from the Roots.

To explain this, let us conſider thoſe Plants which are cultivated in Pots, and ſet ſingly in Chambers, and other places of the Houſe for Ornament in the *Summer*; tho' we allow them large *Pots*, freſh *Earth*, and *Water* enough, and *Air*, as much as they have in a *Green-Houſe*; how ſenſibly do they decline in a few Days, which happens only for want of that *Steam* which is always abroad (more or leſs) riſing from the Earth in the Day, and condenſing and falling upon them again at Night.

Nor can the *Pots*, ſet ſingly in a Chamber, have this help as thoſe have which are ſet together for Shelter in the *Winter* in a *Green-Houſe*; the number of *Pots*, in a Collection of *Plants*, affording *Steam* enough to nouriſh one another, which one ſingle *Pot* muſt want.

The like is to be obſerv'd in a dry Seaſon, when we are forced to water Plants that ſtand abroad; they are by that help but juſt kept alive, becauſe the Earth round about them is ſo dry, that it hardly emits any *Steam*, or at leaſt not enough to ſupport them; but when Rain has fallen, we find a contrary Effect; the Vapours then riſe from the Earth every where about the *Plants*, and make them flouriſh: So that I prefer the Floating of Grounds, for the Welfare of many Kinds of *Plants*, before ſimple Watering; but there are ſome particular Sorts which it would deſtroy, as I ſhall explain elſewhere.

A *Hot Bed* then appears to be of Uſe ſo long only as it can ſend out ſuch *Vapour* from the Earth lying upon it, as is neceſſary for the Support of the *Plants*; and when it wants the *Heat* which is requir'd for that purpoſe, it muſt be renew'd; for elſe the Moiſture, which muſt be maintain'd to nouriſh the Roots of the *Plants* growing in it, will chill and deſtroy them. I would not be ſuppoſed here to mean the *Steam* which ariſes from the *Dung* it ſelf, for that is known to be deſtructive to all *Plants*; 'tis the *Vapour* only which the *Heat* of the *Dung* evaporates from the Earth lying upon it, which will help the *Plants*, and that too muſt be temperate and well qualified, leſt it ſcall'd them, which may be moderated according to our Deſire, by laying the Earth upon our *Hot Bed* of a due Thickneſs, anſwerable to the *Heat* below it.

Having thus given my Opinion concerning the Qualities requir'd in a *Hot Bed*, I ſhall in the next place proceed to give proper Directions for making it. The *Dung* of *Horſes* or *Aſſes*, ſuch as is taken freſh out of the Stables or Stalls, is the moſt proper for our purpoſe; it ſhould then be thrown up into a Heap, with a few Sea-Cole Aſhes among it, and very well water'd. In this State, if the Quantity be very large, it ſhould lie to heat about eight Days; but two or three Loads only need not lie above half that time before you uſe it. The Bed then muſt be mark'd out ſomewhat more than three Foot wide, anſwerable to the Size of your Frames; the length of it running from *Eaſt* to *Weſt*, ſo that it may face the *Sun*. Some *Gardeners* dig a Trench a Spit deep to make the Beds in, and others ſave that Trouble, and make it all above Ground; I have try'd both ways, and find ſo little difference, that I cannot ſay which is beſt: But I think if the Ground be wet and ſpringy, it is moſt reaſonable to make the *Bed* quite above Ground, leſt the *Dung* be chill'd. In the ſpreading of the *Dung*, we muſt chiefly have regard to lay it equal in every Part, that when the *Bed* comes to ſettle, it may not lie uneven; and beſides, that it may heat altogether; The whole muſt be trodden down from time to time, as freſh Litter is laid upon it, 'till at length the *Bed* is of the Subſtance you deſire, which ought to be (in *Winter*) about three Foot high.

Having thus prepared your *Bed*, ſet on your Frames, and put the Earth you deſign for it upon the Dung, laying it ridge-wiſe, that it may be more conveniently turn'd over as you ſee occaſion, if the *Bed* ſhould burn. When you find the extream *Heat* begins to abate, level the Earth upon it, to ſow what Seeds you deſign; minding always to have upon your *Bed* five or ſix Inches thick of Earth to prevent the extream *Heat* of the *Dung* from ſpoiling your Crop; and that the Roots of whatever you ſow or plant, may always keep free from the Dung, which whether it be hot or cold ſpoils moſt Plants that touch it. In ſhort, to ſee the working of two or three *Beds*, if a Man is careful to make Obſervation of them, will better inform him than any written Directions; for ſome *Beds* will heat ſooner than others. And again, I have known one *Bed* out-laſt three in its *Heat*, which depends partly upon the Nature of the Dung it is made of, and alſo in the true Method of working it. The Frames which cover theſe *Beds* likewiſe, contribute greatly to the maintaining the *Heat* in them. A large Frame requires a greater *Heat* to warm the *Air* it encloſes than a ſmall one: So if two *Beds* were made equally (as poſſible) of the ſame Strength; the one cover'd with a large Frame, and the other with a leſs; that with the large Frame would ſooner cool than the other, and perhaps preſerve a *Plant*, when thoſe under a ſmaller Frame would burn: And the too frequent opening of a *Bed* likewiſe contributes to cool it much ſooner than it would otherwiſe be. In a word, rather deſire ſuch *Heat* only in your *Hot Bed*, as will ſuffice to keep out the Froſt, than covet to make your *Plants* grow quick.

But as it is not ſuppos'd that any *Hot Bed*, without ſome Help, can maintain its *Heat* long enough to bring what we plant upon it to Perfection; ſo it is commonly practiſed, when it begins to cool, to cut away the Sides of it ſlope-ways, and laying freſh *Dung* to them, it recovers its loſt *Heat*, which is call'd *Backing* or *Lining* of a *Bed*; and this Work the skilful *Gardeners* will repeat ſometimes five or ſix times in a Seaſon, as they ſee occaſion, rather than make freſh *Beds*.

If a ſufficient Quantity of *Dung* freſh from the *Stable* cannot be eaſily compaſs'd, we yet need not be deſtitute of a *Hot Bed*; ſome *Horſe-Litter* already cold; *Straw* ſteep'd in *Pond-Water* two or three Days; *Graſs*, *Coal-Aſhes*; and, if they can be had, the *Grains* of *Malt* after Brewing, or damaged *Bran* made very wet; if they are thrown together in a Heap, and well water'd, will ferment and heat as well as any Dung we can deſire.

It remains now only that I give Directions for compoſing of *Earth* proper for our *Hot Bed*, which ſhould always be light, freſh, and well ſifted, conſidering how tender the Roots will be of thoſe things which are to grow in it. Take therefore of freſh ſandy *Loam* one half, and add to it an equal Part of *Horſe-Dung* well rotted; let theſe lie in a Heap together well mix'd, to be ſcreen'd or ſifted when it is wanted: Rotted *Leaves*, well conſum'd, are alſo good if *Dung* is wanting.

CHAP. II.

Of MELONS, CUCUMBERS *and* MUSHROOMS, *their* Culture.

HAVING in the foregoing Chapter given the neceſſary Directions for preparing a *Hot Bed*, I ſhall now proceed to offer ſome Obſervations and Experiments I have made in the *Culture* of *Cucumbers* and *Melons*: And firſt concerning the raiſing the *Plants* for the General or *Summer* Crop, for 'tis that we muſt depend upon for a Quantity of Fruit. Towards the beginning of *March* is time enough to put in the Seeds of *Melons*, which we deſign for *Ridge Plants*; thoſe, if the Bed be moderately warm, and in good temper, will come up and be fit to plant out four Inches a-part about a Week after ſowing; they may thus remain 'till their firſt Leaf is about the bigneſs of a Crown-piece; and then, when the ſecond or third Joint appears, cut off the prime Leader from each Plant, near the *Ear-Leaves* or *Lobes*, and they will each of them quickly put out three other *Runners*, which will produce Fruit plentifully; and thoſe alſo are commonly prun'd at every third or fourth Joint when they come to run; this is the common way.

About the latter End of *April*, or the firſt Week in *May*, the *Melon* Plants, thus rais'd, will be fit to plant upon Ridges, which ſhould be made thus: Cut a Trench about two Foot and half wide, and ſixteen Inches deep, in which lay of Horſe-Litter, prepar'd as I have directed for the *Hot Bed*, about two Foot thick, which will raiſe it ſomewhat above the Surface of the Ground: In this Work take care to ſpread the Dung equally, and tread it over gently to ſettle it; then at the diſtance of about four Foot in the middle Line of the Ridge, make Holes about ten Inches over, and about ſix Inches deep, and fill them with the prepared Earth: After this cover the whole with the ſame Soil, about five Inches thick, and make them into flat Beds four Foot wide, for the *Vines* to run upon.

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About two or three Days after the Ridges are thus prepar'd, plant two *Melon Plants* in each Hole, ſprinkling them with Water (that has been warmed in the *Sun*) and covering them with Square or Bell Glaſſes; immediately upon which, either Mats or Straw ſhould be put to keep the *Plants* from withering by the *Sun*'s Heat, 'till they have ſtruck Root; and ſo likewiſe ſhould *Cucumber Plants* be ordered, if they are planted out upon Ridges at this time of the Year; but they require no pruning.

About the latter End of *May*, or a Fortnight after planting, they will be in a growing Poſture; and then if the *Eaſterly* dry *Winds* are ceas'd, tilt up the *Glaſſes* about an Inch in the Heat of the Day, to give them Air for two or three Hours, that by degrees they may be harden'd to the Weather. It is now I cannot help taking notice of two or three things practiſed by the *Gardeners* in the *Culture* of *Melons* and *Cucumbers*; which altho' they may perchance be generally practiſed, yet I am ſure they deviate from the Laws of Nature; and Experience has ſhewn me, that their Work in thoſe Points is needleſs, and might better be avoided. In the firſt place, when a *Melon* or *Cucumber-Plant* is in Bloſſom, it is cuſtomary for them to pull off all the falſe Bloſſoms, which they ſay would weaken the Plant; but if thoſe are the Male Flowers, as they ſeem to be, it is them that are ordained by Nature to ſet the Fruit, (which I think I have already explain'd.) In the next place it is a common Practice to lay the ſeveral Leaders of the *Vines* at equal Diſtances from one another, and often lift them up to view the young Fruit, which is very hurtful; for that the Veſſels which convey the Juices to the Fruit are very tender, and ſubject to be bruiſed by the leaſt bending from their Place of natural Growth. But yet more than this, I have ſeen a Bed of *Melon Plants*, which an Ingenious Profeſſor of *Gardening* has prun'd and laid in order (as he call'd it) with great Dexterity, and had no falſe *Bloſſoms* left upon them, that have from time to time offer'd abundance of *Fruit Bloſſoms*; and by being frequently handled and diſturb'd, have not ſet one Fruit; while on the other Hand two other *Plants* of *Melons*, which were ſown later, by a Month or more, and had been diſregarded, ſurpriz'd him with ſeveral large Fruit, when he hardly expected to find them in Bloſſom: And ſo in the *Vines*, for forward *Cucumbers*, the Fruit that ſets firſt ſeldom comes to Perfection, becauſe upon all Occaſions the *Vine* is taken up to look how it comes forward; but in the moſt remote Corner of the *Bed*, where the *Plants* are the leaſt regarded, commonly comes the firſt perfect Fruit. And laſtly, I find another Practice too frequent, which I account as unreaſonable as the others, and that is the expoſing a young ſet Fruit to the *Sun*, by taking away the Leaves from about it. A Gardener of ſmall Experience may know that Fruit of any Sort grows beſt in the Shade, and that the immediate Heat of the *Sun* is only neceſſary for the Ripening of Fruit, and not for the Growth of it; for the *Sun-Beams* falling directly upon a *Plant* dries and pinches the *Veſſels* of it; ſo that the *Sap* wanting a free Paſſage, it is impoſſible it can fill the *Plant* ſo quickly and plentifully, as it would do if the Parts were larger and more open, ſuch as they are always in the Shade; and that this is Truth, I appeal to common Experience, whether Fruit growing in the Shade, is not larger than the ſame Kind growing in the full *Sun*.

In *Spain*, *Portugal*, and the *South* Parts of *France*, the *Melon Gardens* are ſeldom regarded after they are ſown, 'till the Fruit begins to ripen. And I have been inform'd by ſome Inhabitants of thoſe Places, that they never fail of good and large Fruit in great Quantity, altho' they give them no other Dreſſing than what is neceſſary to prepare the Ground for the Reception of the Seeds.

It was the Opinion of ſome of the Ancients, that Women ſhould not always be ſuffer'd to come among Plants, for that at certain Periods the very Approach of a Female was pernicious and deſtructive to them; but that Notion, with many others of the like Nature, have long ſince been deſtroy'd by Experience to the contrary, and ſeems only to have been maintain'd for want of better Judgment.

But now ſuppoſing our *Melons* are fully ſet, we may then count about forty Days to the Time of their ripening, which I think is obſerv'd as a Rule among moſt experienc'd *Gardeners*: Give them gentle Waterings now and then, if the Earth be extream dry; for *Melons* do not delight in abundance of wet, neither will the *Fruit* be well taſted if the *Plants* are kept too moiſt. But *Cucumbers* love frequent Refreſhings of Water, and will not proſper without it. Upon the Setting of a *Melon* it is commonly practis'd, and with good Reaſon enough, to pinch or prune off the running Branches two Joints above the *Fruit*; ſo that all the *Sap*, appointed for the Nouriſhment of that Branch, may be turn'd into the young Fruit for its Nouriſhment. This may contribute to make the *Fruit* large, if it be well guarded with *Leaves* from the ſcorching Rays of the *Sun*, during the Time of its Growth: But as ſoon as it is fully compleated, then indeed it cannot well be too much expos'd to the *Sun*'s Heat, even to receive it thro' a Glaſs, which will forward its ripening, as may be known by the agreeable Odour it will ſend forth when it is fit for the Table.

For the more certain producing of *Melons* of a right Flavour, let me adviſe that no *Cucumber Plants* be ſet near them, leſt the *Male Duſt* of the *Cucumbers* ſhould happen to be carry'd with the *Wind* upon the *Bloſſoms* of the *Melons*, and perhaps ſet them for Fruit, which will then certainly give the *Melons*, ſo produced, the Reliſh of the *Cucumber* in Proportion as the *Farina* happens to fall in greater or leſſer Quantity. See Part I. Chap. II. *Of the Generation of* Plants.

During the Growth of the *Vines*, the Earth they run upon ſhould be carefully kept weeded and ſtirr'd gently on the Surface; for the Roots both of *Melons* and *Cucumbers* are tender, and always ſhoot out in length as far as the Branches reach: But ſome indeed more than others, are ſubject to run into *Vine*, and that for two Reaſons: *Firſt*, All *Plants*, either of *Melons* or *Cucumbers*, as their Fruit is greater or ſmaller, produce *Vines* of greater Size, or leſſer Proportion. I have known *Vines* of large *Melons* that would ſhoot (if they were left at liberty) about ſix Foot in a *Summer*, and the ſmall Sorts have not grown two Foot; and ſo in *Cucumbers*, one Root of the large *Turky Kind* has produced as much *Vine* as four or five Roots of the ſhort *prickly Cucumber*, which ought to be conſider'd when we plant the Ridges; one *Plant* of a large Kind, if it thrive, will be enough for one Hole, when perhaps of ſmaller Sorts, three or four may be neceſſary for the ſame Purpoſe. But, 2*dly*, All freſh *Seeds* of *Melons* and *Cucumbers* will produce much larger *Vines* than thoſe *Seeds* which have been kept ſeveral Years. New *Seed* is apt to draw ſuch plenty of Nouriſhment, that it is ſeldom prolifick; for too haſty thriving is ever an Enemy to Breeding or Proleficity. So on the other Hand, when I have ſown *Melon* and *Cucumber-Seeds* of ſeven or eight Years old, the *Vines* have been cloſe jointed, and more ſubject to produce Fruit.

The *Italians* have a *Melon* which is commonly ripe about *Chriſtmas*, and eſteem'd among them as a Rarity; ſome of the *Seeds* of it are now in ſeveral Gardens in *England*; but I know not whether every one is acquainted with the right Method of its Management, therefore ſhall venture to give my Advice concerning the raiſing and preſerving that Rarity of the *Winter*: The *Seeds* ſhould be ſown towards the latter End of *April*, or in *May*, in a Bed moderately warm; and the *Plants*, when they are come up, be ſo ordered, that the Fruit ſhould not come to its full Growth 'till the latter End of *September*, or middle of *October*; the natural Warmth of the *Summer*, without any Art, will be ſufficient for that End, 'till the cold Evenings in *Auguſt* begin to approach; then it will be neceſſary to ſhelter both the *Plants* and *Fruit* from the *Froſts* and cold *Dews*, 'till you think your Fruit will grow no bigger; and in the Heat of the Day, ſtrip the *Plants* of their *Leaves*; let the Sun then dry the Stalks, and pull them up by the Roots to hang up afterward in a *Green-Houſe*, or ſome ſuch well-expoſed Place, to dry more thorowly; after which they may be tied up by the Stalks in a dry Room, or laid in Cheſts of Bran, or very dry Sand, to keep them from the *Winter Air* 'till *Chriſtmas*; if they are not then ripe enough, wrap them in a Cloth, and lay them in a Horſe-Dunghil for about Twenty-four Hours, which will ferment their *Juices*, and cauſe Ripeneſs, as I have heard, and am apt to believe.

But ſeeing that the Pride of the *Gardeners* about *London* chiefly conſiſt in the Production of *Melons* and *Cucumbers* at times either before or after the natural Seaſon, I ſhall alſo preſcribe ſome Rules for the Raiſing and Cultivating them at thoſe times, which I ſhall lay down in as plain Terms as poſſible.

Moſt of the *Gardeners* I am acquainted with make their *Seed-Bed* for theſe *Plants* in *January*, altho' ſometimes the Ground is cover'd at that time with *Snow* near a Foot thick; but I muſt confeſs, I ſhall never follow that Method while I have any regard to the Ways of Nature: For is it reaſonable to believe, that young Plants, tender as they muſt be when they are thus juſt forced out of the Ground, can be able to withſtand the leaſt *Air* from abroad, when *Froſts* and *Blaſts* continually reign? And to preſerve them without *Air* is as impoſſible: Therefore to go more reaſonably to work, prepare a *Hot Bed* about four Foot ſquare, and two Foot high, in the firſt Week of *October*, and ſow the *Seeds* both of *Melons* and *Cucumbers* in it, when the Heat of it is moderated; a Week after they are come up, plant them four Inches apart on the ſame *Bed*, after having ſtirr'd the Earth very well: In this Month the Days are commonly warm, and in ſuch Weather they ought to have as much *Air* as you can poſſibly give them; but the Nights are uncertain, and therefore the *Plants* muſt then be cover'd up cloſe with the *Glaſſes* and *Mats* over them. In this firſt raiſing of the *Plants*, a skilful *Gardener* may make them as hardy as he pleaſes; for it is not his Buſineſs ſo much to draw or force them, as to ſtrengthen them againſt *Winter*.

All *Annuals* are as naturally diſpoſed to live from the Autumn to the Spring, if they are kept from flowing in the *Winter*, as they are commonly known to flouriſh in the *Summer* Months; and both *Cucumbers* and *Me-*

lons, which are likewiſe of the *Annual* Race, might as well be kept the *Winter* as any other *Exotick Annual* whatſoever, if we would not let them bloſſom before *Chriſtmas*, I have my ſelf kept young *Plants* of *Amaranths*, and of the *Naſtertium Indicum*, which I ſowed in Autumn, 'till the *Summer* following, only in a common *Green-Houſe*; and I am perſuaded *Cucumber Plants* might be preſerv'd almoſt with as little Trouble. I am inform'd, that the laſt Year a *Gardener* ſowed ſome *Cucumber-Seeds* as ſoon as he had gathered them, and cut Fruit from thoſe *Plants* very early in *January*.

When the *Plants* are in the ſecond Joint, I would adviſe that they be hither planted in ſmall *Garden-Pots*, or *Baskets*, open on their Sides, made with *Oziers*, about ten Inches over the Top, and four Inches deep; ſo may we more eaſily remove them without Damage from one Bed to another, as the Severity of the Seaſon may require: But I prefer the *Baskets* rather than the *Pots*; becauſe when the *Plants* begin to run, the *Roots* are at full liberty to find their way into the neighbouring Earth of the Bed they are to ſtand in, without tranſplanting, which might endanger them. In one of thoſe *Baskets* may be planted about five or ſix Plants, leſt any of them ſhould go off; tho' it is reaſonable to believe, that a *Plant*, which has had the Advantage of a gradual declining Seaſon to harden it ſelf in, will not be ſo ſubject to ſuffer by the Weather, or require ſo much Heat to maintain it, as thoſe which make their firſt Appearance in the midſt of Froſt and Snow. In ſhort, let the Gardener rather endeavour to defend them from the Weather, than to force them; as the Bed cools, let him line the Back and Front of it with freſh Dung; let the Plants receive as much Air and Sun as he can reaſonably give them, and guard them well with Straw and Matts in the Night, and there is no doubt but he will have Fruit early enough; but I ſpeak to the Ingenuous, who may yet improve what I have ſaid, and not to thoſe who deſpiſe Learning becauſe they know little.

I ſhall now conclude this Section with a Word or two concerning the raiſing of *Cucumbers* on the Natural Ground for Pickling; for this we have no more to do than chuſe a Piece of Ground pretty rich, and well expoſed to the Sun; and after having wrought it well with a Spade, make Holes in the Form of Baſons, about four Foot diſtant from each other, and ſow the Seeds in them the firſt Week in *May*, if the Weather be ſettled; put at leaſt a Dozen Seeds in a Hole, for it is much better to have Plants to fling away, than to want a Crop, which often happens by being too covetous of Seeds.

SECT. III.

Of MUSHROOMS.

WHoever has been accuſtomed to eat *Muſhrooms*, will certainly allow them to be one of the greateſt Dainties the Earth affords, eſpecially the *Morel*, *Trufle*, and *Champignion*; the two firſt have been found in but few Places in *England*; but I am apt to believe they are as plentiful with us as the other, if they were skilfully ſought after; they are to be met with in the Woods; the *Morels* chiefly appear in *April*, and the *Trufle* about that time may be dug out of the Ground, for they never appear above the Earth. Thoſe who make it their Buſineſs in Foreign Countries to gather the *Trufles*, have only one way (as I can learn) to find out where they grow, and that is by the help of a Hog, who they lead in a String thro' the Woods, ſuffering him to root up the Earth as he goes along; for Swine being very voracious of them, diſcover them by their Smell, and turn them out of the Ground; of theſe Kinds I have not known any that have been propagated by Art, as the *Champignions* have been, which tho' this laſt kind is common enough in many Places in *England*, without any Culture, yet it turns to good Account to raiſe them in our Gardens, ſince the Trouble of doing it is not conſiderable, and their Uſe begins to be known. The true *Champignion* has its Fleſh very white, firſt appearing like a Button, with a Footſtalk adhering to it, the Chives within it are of a Fleſh Colour, and as the Cap of it explains it ſelf, thoſe Chives become darker by Degrees, and are at length black: I have ſeen ſome of the Caps when they have been fully explain'd about ſix Inches over, and of a conſiderable Thickneſs. This kind is the only ſort I can recommend for its Goodneſs among the *Cap-Muſhrooms*, and then only when they are freſh and free from Worms, which are apt to breed in them, their Stalks eſpecially, and ſuch are not accounted wholſome. We commonly find this ſort growing in rich Paſture-Grounds about the latter end of *July*, or in *Auguſt* and *September*, after Rains have fallen.

The Obſervations I have made concerning the natural Produce of *Muſhrooms*, ſeem to diſcover that they are produced by ſome Putrifaction in the Earth, or in thoſe Bodies they are apt to grow upon; we have not in *England* leſs than 100 different Kinds that I have obſerv'd, beſides thoſe very minute Sorts that can only be diſcern'd with the Microſcope in the Moldineſs of Fruit and Liquors, which laſt Kinds are ſo quick of Growth, that in leſs than twelve Hours time they are perfected; and ſhedding their Seeds, ſeveral Hundreds of the ſame Kinds immediately vegetate; whence it is that Moldneſs ſo ſoon overſpreads thoſe Bodies it once infects.

The Rings of *Muſhrooms*, which are often ſeen upon Downs, Plains, and Commons, are called by the Country People *Faries Dances*; theſe are not always of one Sort of *Muſhroom*, but various, according to the Soil that produces them. It is obſervable, that the Graſs is always much greener and ranker in the Line where thoſe *Muſhrooms* appear, than in other Places of the ſame Grounds, which I have often wonder'd at, as well as the exact Figure of a Circle they have repreſented. When I enquired into the Reaſon of this ſtrange Production, I diſcover'd two Things worth Obſervation; the firſt was, that juſt under the Turf where the *Muſhrooms* were growing, was a Tract or Path made by *Piſmires*, which was not only hollow in many Places at that Time, but the very Covering of that Paſſage was made of Earth extreamly fine, which thoſe Creatures had flung up: The Fineneſs of the Earth wrought by thoſe laborious Animals might very reaſonably contribute to the extraordinary Vegetation of the Graſs growing upon it, and the Hollowneſs of the Ground underneath might produce that Moldineſs within it, which afterwards might be formed into *Muſhrooms*; for it has always been my Opinion, that if Earth is made extreamly fine, and by that means the *Salts* of it more at liberty to act, whatever grows upon it will be much more vigorous. Again, we find by Experience, that in ſuch Places where the Ground lies hollow near the Surface, it always turns muſty and moldy.

But 2*dly*, *Garden-Snails*, the large black *Dew-Snails*, and others without Shells, call'd *Slugs*, when they couple, always make choice of ſhort Graſs to creep upon; It is their manner, when they generate, to take a large Compaſs upon the Ground, and meet one another: Thus I have ſeen them creep into a Circle for more than half an Hour, going over the ſame Ground at leaſt twenty times before they could join, leaving upon the Graſs where they crept, a viſcous ſhining Matter. So that it may be, that Slime, when it putrifies, may produce the *Muſhrooms* we find growing in Circles upon Commons; and I am the more apt to believe it ſo, becauſe I have more than once obſerv'd, that where a *Snail* has left ſuch a Tract upon the Graſs, a few Days afterwards I have found *Muſhrooms* to come up: But it muſt be obſerv'd, that ſuch as come up in this manner are not fit to eat. However, I ſuppoſe from Hints of this kind it was, that the edible Kind was firſt propagated in the Garden.

It is practiſed in *France*, to dig a Trench five or ſix Inches deep in the Ground, and lay in it either the Dung of *Horſes*, *Mules*, or *Aſſes* Ridge-wiſe, in the Shape of an *Aſs*'s Back; then cover the Dung about two or three Inches thick with freſh Earth, ſuch as is juſt taken from under a Turf, rather ſandy than otherwiſe, and then cover the whole Bed either with Straw or dry Litter, as well to defend it from the Froſt in the *Winter*, as from the ſcorching Heat of the *Summer*'s Sun. The Bed being thus prepar'd, water it twice or three times a Week, without taking off the Covering of Straw, and in about two Month's time the *Muſhrooms* will begin to appear, and muſt then be cut as they come up, and not drawn up by the Root. Theſe Beds may be made every Month to produce *Muſhrooms* all the Year about.

The late Famous Mr. *Harriſon* of *Henly* made *Muſhroom* Beds much after the ſame manner, only inſtead of Horſe-Dung he made uſe of old Thatch, which he told me turn'd muſty, and grew moldy much ſooner than Horſe-Dung, and would produce *Muſhrooms* quicker, and in greater Plenty; but either way will do very well.

So I have likewiſe known the *Melon* Ridges, which have been made as I have directed, about Autumn to produce *Muſhrooms*, eſpecially if the Earth upon them has not been of any great Subſtance; and that Straw or Litter has been laid upon them, and frequently water'd.

It is ſaid, that the Cuttings of the *White Poplar* or *Abele* about the Root, being ſteep'd in hot Water, well fermented with *Yeſt*, will produce very good *Muſhrooms* in a few Days: And it is likewiſe reported, that the looſe Chips of the ſame Tree, being buried in a decay'd Hot Bed, will do the like.

About *Naples* there is a Sort of *Stone* which produces good *Muſhrooms*, if it be laid in a moiſt place, or well water'd.

CHAP. III.

Of ESCULENT ROOTS, *or ſuch as are proper for Table Uſe.*

THE *Roots* which are commonly made uſe of for the Table are *Parſnips*, *Carrots*, *Turneps*, *Skirrets*, *Scorzonera*, *Beets*, *Radiſhes*, *Horſe-Radiſh*, *Potatoes*, *Jeruſalem-Artichoke*, *Onions* and *Leeks*, and their Kinds.

SECT. I.

Of the PARSNIP.

TO begin with the *Parſnip*; it affords a large ſweet *Root*, very nouriſhing, and of great uſe in the *Winter*: This Plant delights in a rich Soil, where the *Root* of it will become very large, but ſhould not be eaten 'till the Froſts have entered the Ground. The *Seeds* of it are ſown in *March*, and will come up in about three Weeks time; when they have been above Ground about a Month, they muſt be hough'd, leaving the ſpace of about five or ſix Inches between the Plants. A skilful *Gardener* will ſow *Radiſhes* among them, which in about forty Days may be drawn off; or ſometimes *Spinage*, which will alſo be fit to cut before the *Parſnips* begin to ſpread. And indeed it is not the leaſt part of a *Gardener*'s Skill to underſtand how to double Crop his Ground with ſuch things as will not ſpoil one another. After the firſt houghing of the *Parſnips*, keep them as clean from *Weeds* as poſſible, 'till they are full grown, and then take them up and keep them in *Sand* for Uſe.

SECT. II.

Of the CARROT.

CARROTS delight in ſandy Soil, where their *Roots* will grow to a great Bigneſs, and be much ſweeter, and more free from Worms than thoſe which are ſown in rich Garden Ground. Sow thoſe you deſign for *Winter* Uſe at the ſame time you ſow *Parſnips*; and in the ſame manner fling in among them *Radiſh* and a few *Lettuce*; when they are come up, hough them as I have directed for the *Parſnips*, and take them up when they are full grown, to be kept in Sand for *Winter*. About *London* the Gardeners are curious to have young *Carrots* for the Spring, which they raiſe in the following manner. Towards the End of *July* they prepare a Piece of Ground, and ſow it when it is moſt likely to rain; and about *Michaelmas* (if the Seeds be good) and the Weather has been favourable, the Roots will be ſomewhat larger than a Tobacco-Pipe, and the *March* following will be fit to draw for the Table; but this Crop muſt be ſoon gather'd, leſt they run to Seed, which they will certainly do in *May*, and then they will not be fit to eat. But that there may not want ſome to ſucceed theſe, I have known an ingenious *Gardener* make a hot Bed in *February*, which he cover'd about ſix Inches thick with Earth, and ſow'd it with *Radiſh* and *Carrot-Seed*, covering it in bad Weather with Mats upon Hoops. The *Radiſhes* will ſoon be fit to draw, and the *Carrots* be ready for the Table about *May*, when the Spring Crop is gone.

SECT.

SECT. III.

Of the TURNIP.

TURNIPS have many Excellencies, and are more generally propagated about *London* than any other Root; they are a wholſome Diet, and are of extraordinary Uſe to the Farmer for feeding Cows and Sheep. This kind of *Root* is always ſweeter in a ſandy Soil than any other Ground, but will have larger Roots if the Land be ſomewhat inclinable to Loam. From the middle of *July* to the tenth of *Auguſt*, and not later, the Seeds may be put into the Ground, that the Roots may have time to apple (as they call it) before *Winter*. When the *Plants* have two or three Leaves a-piece, they ſhould be hough'd at the Diſtance I preſcrib'd for *Carrots* and *Parſnips*, and this Crop will be off time enough in the Spring either to ſow *Barley*, or any other Grain or Seed on the ſame Spot. It is ſeldom practiſed, tho' I think it would be very acceptable, to provide *Turnips* for the *Summer*: And indeed I ſee no reaſon why we may not have them all the Year about: We may ſow them in the Spring as well as at Autumn; but planting them out from Seeding-Plants in the Spring and Summer Months will do much better. I have more than once known the Experience of this way, and find it to anſwer as one would deſire.

SECT. IV.

Of the SKIRRET.

THE *Skirret* has a very agreeable Root; altho' it is propagated but in few *Gardens*; and it may be, the Rarity of it is owing to the want of the right way of Cultivating it. We may propagate it two ways, either by ſowing the Seeds in *March*, or by tranſplanting the *Off-ſets* from the *Roots* in that Month: It delights in a light rich Soil, ſomewhat moiſt, which I find contributes to make the Roots large. About nine Years ſince a *Gardener* in *Surrey* ſent to me for ſome *Seeds* of this *Plant*, and ſow'd them in a black moory Soil, which had lately been a Plantation of *Aſparagus*; in that Spot of Ground he had the largeſt *Skirrets* I ever ſaw, and very ſweet; but about *London* 'tis more generally practis'd to raiſe them from Slips or Sets, which muſt be done thus: In *March*, when the Leaves begin to put forth, take them out of the Ground and part them into as many Slips as you can take off with *Roots*; but be ſure let only the freſh ſpringing *Fibers* remain on them, and not any of the old *Roots*; then prepare *Drills* about four or five Inches deep, to plant them in five or ſix Inches a-part, and keep them well water'd 'till their Roots are full grown; then take them freſh out of the Ground, as you have occaſion to uſe them. Some ſay the *Roots* will be larger if they are not ſuffer'd to run to Seed.

SECT. V.

Of SCORZONERA *and* BEETS.

SCorzonera, or *Spaniſh Salſifie*, has a Root, which in my Opinion is no leſs pleaſant than the former; it loves a light Soil, and is eaſily raiſed by ſowing the Seeds in *March*: And *Beets* alſo, both the Red and White Kinds, are raiſed in the ſame Month from Seeds, and delight in a ſandy Soil.

SECT. VI.

Of the RADISH.

I Have already mention'd the *Radiſh*, as a *Root* which might be ſown promiſcuouſly among other Roots in *March*, but ſome Particulars in the *Culture* of it yet remains worthy the Knowledge of my Reader. The Soil it chiefly covets is Sand, or other light Ground well wrought with the Spade: It may be ſown in ſuch Land any time between *February* and *September*, minding always to let the Ground you ſow be more in the *Shade*, as the Seaſon is more hot. I have ſown ſome *Seeds* of the *Spaniſh Radiſh* in *Auguſt*, that have been fit to draw juſt as the *Winter* began, and have continued good 'till the *February* following: But to have a Crop to ſucceed thoſe, it is common to ſow ſome at *Michaelmas*, that they may be above Ground in their *Seed-Leaf* only before *Winter*, and thoſe will be in Seaſon about *March*, if they have had the Shelter of ſome warm Wall.

SECT. VII.

Of HORSE-RADISH.

THE next *Root* I have to treat of is the *Horſe-Radiſh*, which no *Kitchen-Garden* ought to be without. I have known ſome *Gardeners* plant Roots of it on a piece of Ground three or four Inches deep, and then letting it ſtand three Years, have taken it up for Market: But a much quicker and better way has been experienc'd by a Friend of mine for the propagating this *Root*, which was in this manner: Dig a Trench in ſome remote Corner of the *Garden*, about three or four Foot wide, and about ſixteen or eighteen Inches deep; the Soil, if poſſible, ſhould more incline to Sand than Clay; and at *Michaelmas*, which is the beſt time for this Work, cut ſome *Horſe-Radiſh Roots* in pieces of three Inches in length, or thereabouts, and ſow them in the bottom of the Trench, covering them with the Earth that was taken out of it; the Spring following you will find them ſhoot above Ground, five or ſix Heads from each piece of *Root*, and the *Michaelmas* after that will be ſtrong enough to take up; they will then be ſtraight, well grown, and without Knots, fit for Uſe.

SECT. VIII.

Of POTATOES.

POtatoes and *Jeruſalem-Artichokes*, are *Roots* of leſs note than any I have yet mentioned; but as they are not without their Admirers, ſo I ſhall not paſs by the Method of their *Culture* in ſilence. The *Potatoe* rather loves a ſandy than a ſtrong Soil, tho' I have ſeen them do well in both; but have obſerv'd, that the Roots knot much better, and are ſweeter taſted in the *Sand*. The ſmaller Roots or Knots of them are commonly ſaved to raiſe a Crop from, and ſet about four or five Inches deep in the Ground in *March*, at ſix or eight Inches a-part: When their Haulm begins to decay, which is about *Michaelmas*, we may take them out of the Ground with Forks as we have occaſion to uſe them. Where they have liked the Ground, I have ſeen above thirty *Knots* or *Potatoes* hanging on the Strings or Fibers of one Plant.

The *Jeruſalem-Artichoke* affords a *Root* as large as an ordinary *Turnip*, which in its Taſte differs from the *Potatoe*, it being more watery and flaſhy: It is one of thoſe *Plants* which can hardly be got out of the Ground it is planted in, and delights chiefly in a ſtiff Soil, where I have moſt commonly ſeen it growing; every little part of the *Root* will grow if they are planted in the Spring like the *Potatoe*, and about the *Michaelmas* following will be fit for Uſe.

SECT. IX.

Of the ONION.

I Now come to treat of the *Onion*, a *Root* more generally uſed in the *Kitchen* than any other: Of this there are two Kinds worth the *Gardeners* Care; the firſt is the *Spaniſh Onion*, which affords a large ſweet-taſted Root; and the other the *Strasbourg Onion*, which is more biting, and laſts good much longer than the former; but the difference of theſe two Kinds make no Alteration in the Culture of them; they ſhould both be ſown early in *March*, in rich Garden Soil, and hough'd about the latter End of *April* with a very ſmall Hough, leaving about three Inches between the *Plants*, 'till they begin to grow fit for *Sallets*, and then they may be drawn or thinn'd where they ſtand cloſe together. In the ſowing of this Crop, let not the *Gardener* be too ſparing of *Seeds*, leſt many of them be naught, which often happens, and it may be too late in the Year to re-ſow the Ground, when he is convinced the firſt *Seeds* have fail'd; better too many than too few; the Ground may be eas'd of too great a Burden, ſooner than over-loaded with it. When the *Leaves* begin to change their Colour, the *Roots* will grow no more that Year, and then they may be pull'd up in dry Weather, and laid in Rows expos'd to the Sun, 'till they are dried as well as may be without Doors: After which let no Rain get at them, but ſpread them on the Floor of a *Green-Houſe*, or ſuch cover'd place, to dry more thorowly for laying up for *Winter*. Some of this Store may perhaps remain good 'till towards *April*, if they were well dried at gathering, and kept ſo afterwards; but it will be impoſſible, with the greateſt Care, to keep many of them from growing in the Houſe; and of thoſe which happen to *ſpire* about the beginning of *February*, and have large *Roots*, plant them at two Inches diſtance in Lines, half a Foot a-part, to bring *Seeds* for another Year. When theſe have ſhot up the *Flower-Stems* about two Foot high, ſecure them with Sticks from the Aſſaults of the *Winds*; and as ſoon as the *Seed-*

Veſſels begin to open, cut them off and ſpread them on a *Mat* in the *Sun* to ripen, turning them every Day for a Fortnight or three Weeks before they will be fit to be beaten out of their Husks: Take ſpecial Care no Wet get at them, for they will ſprout with the leaſt Moiſture, and never afterwards be fit to ſow. It is a certain Rule, That if any *Seed* has had Moiſture enough to put forth its *Radicle* never ſo little, and is after that check'd before the *Ear-leaves* appear, it cannot by any means be made to grow afterwards.

The beginning of *Auguſt* we muſt ſow a freſh Crop in ſome warm place to ſtand the *Winter*, and ſupply the *Kitchen* when the dry'd *Onions* are gone. This Sowing will be fit to draw in *April*, and furniſh a Supply 'till the Spring Crop comes in.

SECT. X.

Of the LEEK.

THE *Leek* is ſown in *March* in a well-wrought Ground, and ſhould be hough'd like the *Onions*, and kept free from *Weeds*. In *July*, about the middle of the Month, plant them out in Lines about five Inches a-part in very rich light Soil, but chuſe wet Weather if poſſible, which will contribute to make them very large; for one

Shower of Rain does more good to any new tranſplanted Herbs than twenty Waterings. The *Leek* will not bear *Seed* 'till the ſecond Year, and then muſt be gather'd and order'd like *Onion-Seed.*

SECT. XI.

Of GARLICK.

GArlick is propagated from *Cloves* of the *Root* planted early in *March*, about five Inches a-part, the Soil light and ſandy; for ſtiff Ground makes the *Roots* ſmall: The *Blade* will begin to turn Yellow in *July*, and then take them up in a dry Day, and tie them in Bunches for Uſe. This and all other Roots that are to be kept the *Winter*, muſt be very well dry'd, or they will rot.

SECT. XII.

Of ESCHALOTS.

ESchalots, or *Shallots*, are of ſuch Uſe in *Cookery*, that a *Kitchen-Garden* ought not to be without 'em: A light ſandy Soil is the moſt agreeable to them, without any Mixture of Dung: They are propagated by planting their *Cloves*, or *Off-ſets* of the *Roots* early in *March*, about four Inches a-part, and will be fit to take up as ſoon as their Blade turns Yellow, which will not be 'till the latter end of *June*, or beginning of *July*, if they like the Ground; then let them be well dry'd and laid up for Uſe. *N.B.* About a Rod ſquare of Ground, planted with theſe *Roots*, will be enough for the Uſe of any Family.

SECT. XIII.

Of CHIVES *and the* ROCAMBOLE.

CHives ſhould always be found in the *Kitchen-Garden*; they are frequently uſed in the *Winter* in *Sallets*, when young *Onions* are ſcarce. The *Off-ſets* of their *Roots* ſhould be planted at ſix Inches diſtance in *March*, cutting off their Blades at the ſame time; they love a light rich Ground and Shade: Thus order'd, they will be fit for Uſe at any time of the Year; and the oftener they are cut, the ſmaller will be their Graſs: About one Rod ſquare of them will ſerve a large Family.

The *Rocambole*, for its high Reliſh in *Sauces*, has been greatly eſteem'd formerly, but now-a-days is hardly to be met with; I think however it ſhould not be wanting in a compleat *Kitchen-Garden*; for conſidering how ſmall a quantity of it is ſufficient to give us that Reliſh which many *Onions* can hardly give, it ought to be preferr'd. The

Part of this *Plant*, which is made uſe of, is the Head of the *Flower-Stem*, compos'd of many ſmall *Bulbs*, which, as ſoon as they are ripe, ſhould be gather'd and kept dry.

It is propagated by planting the *Off-ſets* of the *Roots*, or little *Bulbs*, ſix Inches a-part in *September*, and delights in a ſandy Loam, without any mixture of Dung.

CHAP. IV.

Of ASPARAGUS, ARTICHOKES, COLLY-FLOWERS, CABBAGES, *and others of the* Cole Race.

THE *Aſparagus* is one of the great Dainties of the Spring, and what I account to be part of the moſt neceſſary Furniture of a *Garden*; it brings great Profit to the *Gardeners* near *London*, either propagated upon natural *Beds* (as they are call'd) or when they are forced with Dung in the *Winter*. I have heard that a *Gardener* about *Weſtminſter* has receiv'd above thirty Pounds in one Week for forc'd *Aſparagus*.

I ſhall therefore be very particular in ſetting down the Method of propagating this *Plant*, as well in *Natural Beds*, as in the

Hot Bed; and firſt begin with the *Seeds* and Manner of raiſing them.

Such as are minded to make a Plantation of *Aſparagus*, ſhould have a peculiar regard to the Goodneſs of the *Seed* they deſign to ſow, for therein lies the chief hopes of Succeſs; the largeſt *Buds* therefore ſhould always be encouraged to run up as ſoon as they appear above Ground; and when they begin to branch muſt be ſtaked up to ſecure them againſt the Winds: Theſe vigorous Shoots will afford us *Seeds* well nouriſh'd, partaking of the Strength of the *Mother Plant*. The largeſt I have yet ſeen are the Produce of *Baterſea* in *Surrey*, and ſuch like Places, where the *Soil* is *ſandy*; ſo that we may readily infer what Soil is the moſt proper for them. In Ground of that kind, without any mixture of Dung, I recommend them to be ſown about the firſt Week in *March*, if the Weather be open. In this Seminary they come up without any Trouble, and will be fit to plant out the *February* or *March* following, either to train up for *Hot Beds*, or to be planted for a Crop in *Natural Beds*; for *Plants* of one Year old will thrive much better when they come to be tranſplanted in *Natural Beds*, than thoſe that have ſtood two Years in the *Seed Bed*.

If we raiſe them for the *Hot Bed*, make choice of a piece of Ground that has been enrich'd with Dung, and well dug and mellow'd;

low'd; upon which ſtrike out Lines at ſeven or eight Inches a-part, and plant the *Aſparagus Roots*, when they are one Year old, in them at four Inches Diſtance: In this Nurſery they are to remain two Years before they will be fit for the *Hot Bed*, cutting down their *Haulm* every *Michaelmas* and keeping them free from Weeds, as we muſt do the Plants in the *Natural Beds*.

If we chiefly covet to raiſe *Aſparagus* in the *Winter*, ſow every Year, and make Plantations after the ſame manner related, to have Plants that may ſucceed one another. The *Hot Beds* muſt be made pretty ſtrong, and cover'd immediately with Earth ſix Inches thick, encompaſs'd with *Straw-Bands*; in this plant your *Aſparagus Roots* (taken freſh from the *Nurſery Beds*) as cloſe as they can be placed together without trimming them, or cutting off any of their *Fibers*. When this is done, cover the Buds of the Plants two Inches thick with Earth, and let it remain in that State for five or ſix Days before the Frames and Glaſſes are put over it, and then lay on three Inches thick of freſh Earth over the whole; in about ten Days after Planting, the Buds will begin to appear above Ground, and then give them what Air the Seaſon will allow; for 'tis the Air that makes them Green, and chiefly contributes to their good Taſte.

A *Bed* thus prepared will laſt good about a Month, ſhooting freſh Buds every Day, if the ſevere Weather does not hinder: As it begins to cool ſome warm Horſe-Litter ſhould be laid upon the Glaſſes every Night, which will contribute as much to make the Buds ſhoot, as if they were to have new Dung put under their Roots. The time for this Work is from *November* 'till *April*, when the natural Crop comes in, making freſh Beds every Month to follow one another, and give us a conſtant Supply.

But to plant *Aſparagus* for a *Natural Crop*, we muſt proceed in a very different way. About the beginning of *March* (which is the beſt time for tranſplanting of *Aſparagus*) meaſure out your Ground, allowing four Foot for the Breadth of each *Bed*, and two Foot for every *Alley* between the *Beds*; open a Trench at one End of it, and lay into the bottom of the Trench about the Thickneſs of ſix or eight Inches of Horſe-Dung well rotted: Go on then to trench the ſame quantity of Ground, lying next to the firſt Trench, throwing the Earth which comes out of the ſecond Trench upon the Dung laid in the bottom of the firſt: Continue to work in like manner 'till the whole Piece is compleated and levell'd; then in Lines, at eight or ten Inches diſtance, plant the *Aſparagus* taken freſh out of the *Nurſery*, ſpreading their Roots, and covering their Buds with Earth, about four Inches thick.

When four Rows are planted, leave a Space for an *Alley* about two Foot wide, and proceed to place four Rows more for another Bed, and ſo continue your Work 'till the whole is planted. As ſoon as that is done, ſow the whole Piece with *Onions*, and rake it over as level as poſſible, for the *Alleys* will not be of any Uſe 'till after *Michaelmas*, when the *Onions* will be off, and the *Shoots* the *Aſparagus Plants* have made that *Summer* muſt be cut down; then dig up the *Alleys*, and throw part of their Soil upon the *Beds*, to raiſe the Earth about five or ſix Inches above the Buds of the *Plants*, ſupplying the *Alleys* at the ſame time with Dung, or ſome rich Soil.

In this State let the *Beds* remain 'till *March* following, and then rake down the Earth. I have known ſome Gardeners ſet *Beans* about *November*, in the *Aſparagus Alleys*, cloſe under the Sides of the Beds, which may beſt ſhelter them from the *Eaſt Winds*.

The *Alleys* muſt be turn'd up in this manner every *Winter*, and now and then enrich'd with Dung; but we muſt be ſure to let *Michaelmas* be paſs'd before we cut down the Haulm of the *Aſparagus*, and give them their *Winter* Dreſſing; and alſo that we are not later than *Mid-March* without raking and laying ſmooth the *Beds*; for after that time, if we ſhould diſturb the Earth, we ſhould run the Hazard of breaking many Buds that begin to ſhoot.

It is a general Rule not to cut any 'till the fourth Year after Planting, altho' the *Buds* are very large, for it weakens the *Roots*: However I think (to ſatisfie the Impatience of ſome) that where the *Plants* are ſtrong, as in the third Year, a few may be taken here and there in very ſmall Quantities, about ſix times in the Seaſon, without greatly hurting the Plants.

The fourth Year we may certainly begin to cut, and we ſhall then ſenſibly feel the Profit of our Labour and Expectation: Not any Bud that appears above Ground muſt be ſuffer'd to grow in the Cutting Seaſon, unleſs they come from ſuch Roots as have been planted to make good the Deficiencies of the firſt Plantation, and thoſe muſt be ſuffer'd to run up every Year 'till they have gather'd Strength.

About the beginning of *April* the *Aſparagus* appear above Ground, and may be cut 'till towards the beginning of *June*, when they have ſtood five Years, but will not bear cutting longer than *Mid-May* if they are younger: In the Cutting of them have ſpecial regard to cut downwards a little ſloping, with a Knife made blunt at the Point, leſt you injure the *Crown* of *Buds* lying on the top of the *Root*; for if you cut them more horizontally, you may then injure ſeveral Buds that are under Ground: A Piece of *Aſparagus*, thus carefully managed, will laſt good near twenty Years.

SECT. II.

Of the ARTICHOKE.

WE may either propagate the *Artichoke* from *Seed* or *Suckers*, but the latter is moſt commonly practis'd; however let us uſe either way of raiſing them, we muſt be ſure to allow them a ſtrong rich Ground, with Dung mellow'd in it, well expos'd to the *Sun*: About the beginning of *March* we may ſow the *Seeds* to be planted out the following *Month*; and the middle of *March* is the moſt proper Seaſon to ſlip the Roots, either for new Plantations, or to make good the Deficiencies of the old ones, which ſeldom paſs a *Winter* without ſome Loſs, notwithſtanding the greateſt Care has been taken to preſerve them. When we take off the *Slips*, we muſt leave growing upon every old Root (if it be ſtrong) three Heads, which will give us ſo many good Bloſſoms about *Mid-June*; and the *Slips* we take off ſhould be planted two Foot a-part in Lines, four Foot diſtant from each other, for nearer than that would hinder the thriving of the *Plants.* This young Plantation, muſt be well water'd after planting, and perhaps may afford us ſome good Flowers about *September*, tho' for the ſake of the Plants it is to be wiſh'd they would not; for when they bloſſom the firſt Year, the Roots are endanger'd, therefore ſome *Gardeners* break off the Bloſſoms as ſoon as they begin to appear, and about the middle of *July* break off the Stems of the old Roots that have done blowing, that they may furniſh themſelves with freſh Shoots to ſtand the *Winter*.

SECT. III.

Of the COLLY-FLOWER.

WHoever is minded to propagate this *Plant* muſt chiefly have regard to the Goodneſs of the *Seed*, which ought to be ſaved only from ſuch *Flowers* as were large and white, for otherwiſe there can be no hope of Succeſs; and in the next place the Ground muſt be very rich, and not over dry. Being thus provided, we may begin to ſow the *Seeds* in *March*, in ſome well-expos'd Corner of the *Garden*, where the young *Plants* may be ſhelter'd at their firſt coming up from the froſty Evenings. About the middle of *April*, when they are in their firſt *Leaf*, they muſt be planted in a *Nurſery*, about five or ſix Inches a-part, and ſtand there 'till the latter End of *May* or *June*, to be removed to ſuch places as you deſign they ſhall bloſſom in; if it is poſſible, do this Work in rainy Weather, which will make them ſtrike Root quickly; or elſe, if the Seaſon happens to be dry, make Holes in the Ground like Baſons, about three Foot a-part, and water them very well immediately before you plant the *Colly-Flowers* in them, which will contribute to keep the *Plants* freſh and green, 'till their Roots begin to ſhoot; by this means, and frequent Waterings when the Seaſon is dry, we may expect large Flowers in Autumn, but eſpecially if the *Alleys* between the *Plants* are floated with Water, which will nouriſh them much more than common Watering. Some of this Plantation will not offer to flower 'till after *Michaelmas*, and then ſuch *Plants* muſt be taken up with the Earth at their Roots, and ſet together (upright) in a *Green-Houſe*, or ſome other ſuch like place, where the Bloſſoms will enlarge themſelves, and be fit for Uſe in the *Winter:* So likewiſe if we have any *Artichokes* at that time fit to cut, take them with all their Stalk, and ſet them in Sand in the ſame place, which will preſerve them good a long time.

But we muſt take a very different Method to have *Colly-Flowers* in the *Summer*; about the 20th of *July*, or firſt Week in *Auguſt* at fartheſt, we muſt ſow the *Seeds* upon ſome decay'd *Hot Bed*, and tranſplant them about three Inches diſtance, as ſoon as they have made their firſt *Leaf*, upon ſome other well prepared *Bed:* The middle of *September* draw out every other *Plant* from that Plantation, and ſet them four or five Inches a-part, either under a *South*-Wall, to ſtand there 'till Spring, when they are to be planted out for Flowering, or elſe ſet them in the places where they are to bloſſom, and cover them with *Glaſs-Bells* in the Severity of the *Winter*; and this laſt Method I think to be the beſt, becauſe they will be well rooted in the Spring, and conſequently be better able to make large Bloſſoms than thoſe that are planted in the Spring, and have the Difficulty of making new Roots when the others are growing.

Thoſe *Colly-Flowers* that are planted out at *Michaelmas*, will Flower about three Weeks ſooner than thoſe that are planted in the Spring; however it is neceſſary to make Plantations in both Seaſons, that they may not all bloſſom at one time, but gradually ſucceed one another. An underſtanding *Gardener* will alſo make his Spring Plantation of *Colly-Flowers* at ſeveral times, allowing three Weeks or a Month between each; and by that means (altho' all the Plants were rais'd at one time) the checking them at different Periods of Growth, will make them bloſſom earlier or later by two or three Months.

It is a Rule which ought to be obſerv'd, when we plant late in the Spring (in *May* for Example) to ſet our *Colly-Flowers* where they may not have too much *Sun* ; I have known ſome do very well between *Artichoke-Plants*, and ſuch like places ; and then it muſt alſo be obſerv'd that they have Water enough, for they are great Lovers of it. When the Bloſſoms begin to appear, break ſome of the great Leaves and lay over them, to keep the *Flowers* from Rain, and the ſcorching Heat of the *Sun*, which would make them turn Yellow.

In *March* and *April* take care to ſhelter them from the Winds, which are very apt to damage them, and ſometimes blow them up by the Roots : I would adviſe, that if you have a good kind of *Colly-Flower* that bloſſoms early, and has large and cloſe *Flowers*, to let ſome of the forward *Plants* ſtand for *Seed*, carefully tying them to Stakes, that the Winds may not injure them. When the *Seed-Veſſels* are full grown, and the *Seeds* within them are perfected, cut off the whole Stalk, and let it dry in the Houſe before it be thraſh'd out ; for it is not neceſſary to leave the *Seed* upon the *Plants* 'till the *Pods* are dry, leſt they open and ſhed.

SECT.

SECT. IV.

Of CABBAGES, *and their Kinds.*

WE have ſeveral Kinds of *Cabbages*, the large *White Cabbage*, of which the *Gardeners* at *Baterſea* in *Surrey* have a Kind that comes very early, and is the beſt for *Summer* Uſe: If it be ſown in *July*, and ſtands the *Winter*, I have known ſome of them ripen in *May*; or elſe, if we are minded to have of them ripe in the *Winter*, ſow them in *March*, and plant them out in *July* at two Foot diſtance, watering the Ground well before Planting, if the Weather be dry. In the ſame manner alſo muſt be ſown and planted the *Savoy-Cabbages*, or *Savoys* (as they are call'd) for *Winter* Uſe, for they are not good 'till the Froſts have pinch'd them: Theſe and all other kinds of *Cabbages*, will put forth Sprouts from the Stalks, that towards the Spring are even preferable to the *Cabbages* themſelves, and will continue ſo to do 'till the middle of *April*, about which time Greens of this kind are very ſcarce, and therefore young *Cabbage-Plants* and *Coleworts* that were ſown in *July* or *Auguſt*, are then the only Greens, except *Spinage*, that we have recourſe to.

When we have a right ſort of *Cabbage* to our mind, we may plant it for Seed in the following manner: In *January* make choice of the drieſt part of the *Garden*; and having ſtrip'd ſome full-grown *Cabbages* of their looſe Leaves, plant them ſo deep in the Ground that none of the Stalk appear above it, and then make up a Bank of Earth round about the *Cabbage* it ſelf, ſo that none of it be ſeen but the Top, from whence the Flower-Stems will begin to break in *March* or *April*, and then muſt be ſtaked up as the *Colly-Flowers*: The *Seed*, when it is full grown, muſt be gather'd, and order'd like that of the *Colly-Flower*.

CHAP. V.

Of LEGUMES *or* PULSE; *ſuch as* BEANS, PEASE, KIDNEY-BEANS, *&c.*

SUCH as deſign to propagate *Beans* or *Peaſe*, muſt have a large parcel of Ground; for 'tis not a ſmall Quantity will ſuffice to furniſh a very moderate Proportion of them; more eſpecially becauſe they ſhould be ſown at indifferent Seaſons: That from the time they firſt come in, to the beginning of *Winter*, we may always have a freſh Supply of young ones, as the former Crops decay.

SECT. I.

Of BEANS.

THE *Bean* has many Varieties; two Kinds of which I ſhall only make mention of, *viz.* The *Spaniſh Bean* for an early Crop, and the broad *Windſor Bean* for the *Summer:* The firſt of theſe are commonly put into the Ground in *November* or

December, about five Inches a-part in ſome well-expoſed place, commonly in a ſingle Line under a *South*-Wall or Hedge, to ſhelter them from the ſharp Winds of the *Winter*; but I rather make choice of a Hedge than a Wall, for this Reaſon, that when the *Beans* are above Ground, and the *Froſt* takes them, the Wall will, when it is ſomewhat warm'd by the *Sun*, thaw them and the Ground where they ſtand, 'till Night comes on, and then they freeze again; and ſo if the *Froſt* laſts any time, they are continually haraſs'd in this manner, Night and Day, 'till they are deſtroy'd. But on the contrary, a Hedge ſhelters them from the ſharp Winds, and not reflecting any Heat upon them in the Day, as a Wall will do, the *Plants* remain in the ſame frozen State, 'till a general *Thaw* releaſes them, without undergoing ſuch violent Fits of Alteration, which muſt certainly impair their Parts.

If we have double Lines of theſe forward *Beans*, let not the Rows be nearer together than two Foot, for elſe they would ſmother each other when they come to grow up, and then by running too much into Stalk, would produce but few *Bloſſoms*, and leſs *Fruit*: It muſt be obſerv'd likewiſe, that if they have ſhot any conſiderable length before the ſevere *Froſts* begin, they muſt be earth'd up within a little of their Tops; and in the Time of their *Bloſſom*, cut off the Top of every *Bean-ſtalk*, to make them ſet their *Fruit* the better.

About *February* we may ſet a ſecond Parcel of Ground with *Spaniſh Beans*, to come in after the former; and in *March*, plant ſome *Windſor Beans* for the firſt time, for they are tender, and cannot bear the *Froſts*. I have been told by Mr. *Furber* of *Kenſington*, who I have had occaſion to mention before for his Ingenuity, that if we ſet the Rows about a Foot aſſunder, ſuffering them to grow 'till they are almoſt ready to bloſſom, and then cut down every other Line within two or three Inches of the Ground, we ſhall then have a double Crop of *Beans* from the ſame Sowing, one coming in about *July*; and that which was cut down, ſpringing afterwards afreſh from the Roots, will have *Beans* about *Michaelmas*: 'Tis therefore I would adviſe, that if it ſhould happen that two Crops of *Beans*, ſown at different Seaſons, ſhould by Accident tend to bloſſom at the ſame time, as they often do, cut down one of them to have a late Crop.

'Tis alſo neceſſary to ſet *Beans* in *April* and *May* in moiſt places, and then they muſt be allow'd a greater diſtance between each other than thoſe that were planted forwarder in the Spring; but above all, keep them clear of Weeds; and I think it would be good Husbandry to water them about the time of their Bloſſom, if the Seaſon be dry.

dry, I have known likewiſe *Beans* planted in *June*, that have yielded a very good Crop late in the Autumn.

Beans love a ſtiff Soil, without any Manure: When their Seeds are full grown, the Plants may be pull'd up by the Roots, and ſet to dry in ſome well-expos'd place, and then thraſh'd out for Uſe.

SECT. II.

Of PEASE.

THE Kinds of *Peaſe* which I ſhall mention, are the *Hotſpurs* for *Winter* Sowing, the *Dwarfs*, and the *Roncival*, or *Dutch Admiral*, to be ſown in the Spring; theſe Sorts may well enough ſuffice for any *Garden*, without enumerating at leaſt fifty other Kinds that I have heard of, which perhaps are ſo near a-kin to theſe, that the difference can hardly be diſtinguiſh'd but in the Names only. I have often wonder'd at the Indiſcretion of ſome People, who take a Delight in giving cramp Names to Plants, and make it their Buſineſs to multiply Species without Reaſon, as if a Fruit would be the better for a Name that could not be underſtood; or that the Works of Nature were not already numerous enough for us to contemplate: But to ſay no more of that vain Humour, which too many are ſubject to, I ſhall proceed to lay down what I have obſerv'd relating to the Culture of *Peaſe* in a *Garden.*

It is not one of the leaſt Perfections of a good *Gardener*, if he has Ground enough, to provide ſo many Crops of *Peaſe* every Year, as may furniſh a Table throughout the whole *Summer:* About *November* or *December* is ſoon enough to ſow the firſt Crop; for if they were put into the Ground ſooner than thoſe Months, they would be endanger'd by the Froſts: Some of the *Hotſpurs* are the moſt proper for that Seaſon to be ſown in *Drills*, each *Drill* about two Foot from the other, the Lines running from *North* to *South.* When they have ſhot about ſix Inches high, Earth them up about four Inches on both Sides of the Lines, raiſing a little Bank on the *Eaſt* Sides of them, to defend them from the *Blaſts* which accompany the *Eaſt Winds.*

In *February* a ſecond Crop of the ſame kind of *Pea* ſhould be ſown, and in *March* we may put in a third of the ſame Sort. About the beginning of *April* ſome Ground may be prepared for ſowing ſome of the *Dwarf Peaſe*, eſpecially the very ſhort Kind, which ſeldom riſes higher than half a Foot, or covers more Ground than ſix or ſeven Inches ſquare; and notwithſtanding the ſmallneſs of this *Plant*, it will yield near as many *Peaſe* as one of the largeſt Kinds, and thoſe not inferiour to any in their Taſte; theſe *Peaſe* ſhould be ſet four or five Inches a-part, in Lines about eighteen Inches diſtant from one another if they are deſign'd for Table-uſe; or if they are planted for Seed, the Lines need not be above a Foot a-part, for then there will be no occaſion to go between them 'till they are ripe enough to be pull'd up.

Beſides this ſmall Sort, there is another kind of *Dwarf Pea*, which riſes about a Foot high, a very good Bearer, and well taſted: This Sort may be ſown thicker than the former, becauſe they carry their *Vines* more upright; but the Lines ſhould be two Foot a-part. In *April* theſe may be ſown, or in *May* or *June*, as well as the former, to have a conſtant ſupply of young *Peaſe* following one another: The ſmalleſt ſort I have ſown in Edgings, and have gather'd great Quantities from them; and I think them much the beſt for *Hot Beds*, if we covet *Peaſe* in the *Winter*, as they take up but little room, and afford a conſiderable Crop: I am aſſured one *Bed* of them will yield as many *Peaſe* as three *Beds* of the ſame ſize ſown with the common ſorts: For this End ſow them upon a gentle *Hot Bed*, the firſt Week in *September*, about five Inches a-part.

The end of *April*, or beginning of *May*, is a right Seaſon for ſowing the *Roncival*, or

Egg Pea, which is alſo called the *Dutch Admiral*; this is the moſt rampant of all the *Pea* Kind, and therefore requires more room than the others; ſow them about two or three Inches a-part in Lines, planting two Rows within eighteen Inches of one another, and then leave a ſpace of two Foot and half, for an Alley to paſs through when they are fit to be gather'd: Having allow'd this Paſſage, plant two Lines more, eighteen Inches a-part, and ſo continue to do, allowing the breadth of two Foot and half for each Alley, 'till the whole Piece is ſown. When they are grown about ſix Inches high, Earth them up like the others, and ſet one row of Sticks or Boughs, about ſix Foot high, between each double Line of *Peaſe* for them to run up, and they will bear plentifully; which they never will do if they are ſet too cloſe together, or are not ſtaked up.

SECT. III.

Of the KIDNEY-BEAN, *or* FRENCH BEAN.

WE have two Sorts of *Kidney-Beans* common in our *Gardens*; the one which bears early near the Root; without running high, call'd the *Baterſea-Bean*, and another Kind, which is more rampant, growing near ſix Foot high, if it is ſtak'd up.

Beſides theſe, I have ſeen above fifty other ſorts that have been brought from foreign Parts, but ſeldom produce any quantity of Fruit in our Climate.

We ſow *Kidney-Beans* the firſt Week in *April*, in a light freſh Soil, making *Drills* from *North* to *South*, laying the *Beans* in them about four Inches a-part, and covering them with Earth, rais'd in a Ridge to keep the Wet from them; for if the Ground be over moiſt it rots them.

The Lines of the *Baterſea-Bean* ſhould be two Foot a-part, and the other Kind ſhould be ſown after the ſame manner as I have preſcrib'd for the *Roncival Peaſe*, *i. e.* in double Rows and Alleys between them, two Foot and half wide. The *Baterſea* Kind need not be ſtaked, but the others will not bear well without they are ſtaked. From the firſt Sowing in *April*, we may once every three Weeks, 'till the middle of *July*, continue to ſow freſh Parcels of Ground with *Kidney-Beans*, to ſucceed one another 'till the *Winter* comes in.

We muſt obſerve, that when the Ground is very dry, as in *June* and *July*, and the Weather likely to be hot, we muſt water the *Drills* as ſoon as we have open'd them, before we put in the Seed, which will contribute to make them ſprout; but we muſt avoid watering them after they are ſown, leaſt we rot them.

Out of Curioſity I have known ſome of the *Baterſea* Kind of *Kidney-Bean* ſown in *Hot Beds*, five Inches a-part, about the firſt Week in *September*, and they have had *Beans* fit to gather about *January*; but theſe, as well as other *Plants* of this Nature, when they are forc'd, muſt have all the Air that can poſſibly be allow'd them, or the *Plants* will be apt to decay.

The *Wing Pea*, when it is very young, is by ſome dreſs'd and eaten like *Kidney-Beans*, but in my Opinion are not near ſo good; the *Bloſſoms* indeed are of a beautiful Colour, and make a good Show in a *Garden*, if they are ſet in Edgings; it grows in any Soil without difficulty, if we put in the Seeds in *April.*

CHAP. VI.

Of SALLETS, *their* Culture.

AS the different Humours of Mankind will not allow me to preſcribe any certain Mixture of Herbs as the moſt pleaſant to the Palate, ſo I ſhall content my ſelf with giving my Reader only ſome general Hints relating to the ſeveral ſorts of common

Sallet-Herbs, and leave every one to pleaſe himſelf in the Mixture of them.

I would have the Reliſh of the ſeveral Herbs conſider'd, as for Example, which are moſt hot and biting; as *Creſſes*, *Muſtard*, *Sellery*, *Taragon*, *Chervil*, *&c.* and the more cool and inſipid to the Taſte, as *Turneps*, *Rape*, *Spinage*, *Corn-Sallet*, *Letuce*, *Purſlane*, and ſuch like; by this Knowledge a *Gardener*, when he compoſes a *Sallet*, will ſo judiciouſly mix his Herbs, that the too ſtrong Taſte of one Kind may not overpower all the reſt, and diſcreetly make uſe of the inſipid Sorts to qualifie the Pungency and Heat of the others, as the Seaſon of the Year is more hot or cold; ſo that every *Sallet* we eat, may not only be agreeable to the Taſte, but alſo a ſort of Phyſick to the Body.

SECT. I.

Of SMALL HERBS.

WHAT the *Gardeners* call *Small Herbs* in *Sallets*, are ſuch as ſhould be always cut while they are in the *Seed-Leaf*; ſuch are *Creſſes*, *Muſtard*, *Radiſh*, *Turnep*, *Rape*, *Spinage* and *Letuce*; all theſe are commonly known to *Gardeners*, and are generally raiſed by them from the Seeds ſown in *Drills* or *Lines*, about a Yard in length, in ſuch an Expoſure as the Seaſon of the Year requires; that is, from *Mid-February* to the end of *March*, under Glaſſes and Frames; and from that time to the middle of *May*, upon natural Beds of Earth, warmly expos'd; and afterwards, as long as the Summer Heats remain, in more ſhady places. About the middle of *September* and *October* make your *Sallet-Beds*, as I have advis'd in *February* and *March*; and then as froſty Weather begins to come in, prepare moderate *Hot Beds* to ſow your *Sallets* upon, to be continu'd during the *Winter* Months; theſe ſhould have as much Air as poſſible, as well to give them Colour, as to help their Taſte. It ſometimes happens, when the Froſt is very violent, that the *Small Herbs* are frozen, notwithſtanding the greateſt care; but I am told, that putting them into Spring-Water for two Hours before they are uſed, will recover them. I likewiſe find it is the beſt way to draw the *Small Herbs* up by the Roots, from the *Hot Beds*; for if the Roots are left in the Earth, when you ſow a ſecond Crop of *Salleting* upon the ſame *Bed*, it will not proſper. Alſo it ſhou'd be obſerv'd in ſowing the ſecond Crop, that Seeds of the ſame Kind ſhould not be ſown in the ſame Place, but eaſe the Ground with varying its Burden, putting the *Seeds* of hot *Herbs* where the cool ones grew before; and this ought always to be obſerved in the

Culture of every *Plant*, that we do not place them immediately upon that Spot where the ſame Kinds have juſt been growing. The moſt skilful *Farmers* and *Gardeners* obſerve this Rule with that Exactneſs, that it ſeems as if one kind of *Plant* meliorated and prepared the Ground for the Reception of another.

For the greater Perfection of our *Winter Sallets*, it would be well to ſow ſome Lines of *Creſſes* in the natural Ground about the middle of *Auguſt*; for they will reſiſt the Froſts of the *Winter*, and help greatly to enrich our *Hot-Bed Sallets* with the high Taſte they acquire, by being expos'd in the open Air. Likewiſe at the ſame time ſow a *Bed* of *Chervil* for *Winter* Uſe, as well to mix among our *Sallet-Herbs*, as to put in *Soops*, &c.

SECT. II.

Of SELLERY *and* ENDIVE.

OUR *Winter Sallets* are likewiſe greatly improv'd by blanch'd *Sellery*, which is a hot *Herb*, of a very rich Flavour; it is raiſed from Seed ſown in *March* and *April*, in light Earth, in ſome well-expos'd part of the *Garden*, and planted out, about ſix Weeks after it is come up, in Beds, allowing four Inches diſtance between the *Plants*; they may there remain 'till the middle of *June*, at which time ſome of the firſt Sowing will be fit to plant in Trenches for blanching. The Trenches muſt be cut by a Line, eight or ten Inches wide, and about the ſame depth, and as ſoon as they are made, put in your *Plants*, after having prun'd off the Tops and Roots of them: They muſt not ſtand nearer together than five Inches, if they are ſtrong; and as they grow large, Earth them up within four or five Inches of their Tops, and ſo continue to do at ſeveral times, 'till they are fit for Uſe. It is neceſſary to make three or four different Plantations of *Sellery* at ſeveral times, one to come later than the other; and we may note, that theſe *Plants* will not be white 'till ſix Weeks after they are Earth'd up; they love a light rich Soil.

Endive, when it is blanch'd, is much uſed about *London* in *Winter Sallets*; tho' in my Opinion, it is a Plant hardly worth our trouble, as it has neither Taſte or Flavour: It loves a light rich Soil, and ſhould be ſown about the latter end of *April*, leſt it run to Seed, as it is apt to do, if it is ſown too early in the Spring. When it has been come up about ſix Weeks, plant it in Beds as I have directed for the *Sellery*, and about the middle of *July* plant it in Rows, about ſix Inches a-part; and as ſoon as it is well grown, tie up ſome of it to whiten; and every Fortnight, as long as it laſts, tie up freſh Parcels of it.

SECT. III.

Of the CABBAGE-LETUCE.

WE have great Varieties of *Letuce*, many of which have been more eſteem'd for their Rarity than for their Goodneſs; but of all that I have yet try'd, I find none to exceed the good Qualities in the *Roman Letuce*, the *Dutch Brown Letuce*, and the *Imperial* and *Silecia* Kinds; all which ſorts Cabbage extreamly well, and are well taſted.

The *Brown Dutch Letuce*, if it be ſown about the middle of *Auguſt*, will be fit to tranſplant in *September*, to ſtand the *Winter*, either for Cabbaging early in the Spring, or to be cut for *Winter Sallet*; it loves a rich light Soil, and warm Expoſure, as do all of this Tribe, eſpecially if they are ſown towards the Autumn. The *Imperial* and *Silecia Letuces*, if they be ſown about the ſame time with the former, and planted out in warm places, will be very large, and be fit to cut very early in the Spring; but the *Roman Letuce* I have not known to bear the Froſts.

In *March* are commonly ſown all theſe Kinds in the open Ground among other Crops, as I have already hinted elſewhere: And that there may not want a conſtant Supply of them, ſow ſome every Month from *March*, 'till you put in the *Winter* Crop, and plant them out in Beds, about five Inches a-part, three Weeks after they come up; for tranſplanting them contributes to make them Cabbage.

Such as produce large *Cabbages* early in the Spring, may be ſuffer'd to ſtand for Seed, and ſhould be ſtalk'd up leſt the Winds anoy them; but the *Imperial* Kind will hardly run to Seed if the Crown of its *Cabbage* be not cut croſs-ways, and carefully open'd to give way for the *Flower-Stem* to ſhoot; and then likewiſe the *Plant* will be in danger of rotting, if it ſhould rain; therefore fix a *Glaſs Bell* over it: The *Seeds* will be fit to gather as ſoon as they begin to ſhew their *Down*, and then pull up the *Plants*, and ſet them to dry in a *Green-Houſe*, 'till you find the *Seed* is fit to be thraſh'd out.

It is obſervable, that tho' the *Plants* we ſave the *Seeds* from, were of extraordinary good Kinds, yet thoſe *Seeds* will degenerate from the *Mother Plant*, if they are cultivated in the ſame *Garden* where they were ſaved: Therefore if you can poſſibly meet with an honeſt Correſpondent, who gathers yearly the *Seeds* of ſuch *Plants* as you have occaſion for, change with him every Year, and you will both find your Advantage by ſo doing.

SECT. IV.

Of BURNET, CORN-SALLET, PURSLANE, SORREL, SPINAGE *and* TARAGON.

THE Contents of this *Section* will be of the *Culture* of certain *Herbs*, which are often uſed in *Sallets*, and ſerve as Additionals to thoſe I have before mention'd. *Burnet* is a cool *Herb*, a perennial *Plant*, whoſe tender *Leaves* being mix'd with other *Sallet-Herbs* in the *Winter*, gives us the agreeable Flavour of *Cucumbers*: It is propagated by Seeds ſown in *March*, and may likewiſe be encreaſed at that time by parting the Roots.

Corn-Sallet is raiſed from Seeds ſown any time of the Year, and makes a very good Sallet Furniture in the *Winter*.

Purſlane is an inſipid Herb to the Taſte, but very cooling, and is admir'd by ſome People in Summer Sallets: We have two ſorts of it, the *Golden Puſlane* and the *Green* ſort, which are both rais'd from Seeds ſown in ſome warm place in *April*, or may be ſown earlier if they have the help of *Glaſſes*.

Sorrel is alſo uſed in *Sallets*, eſpecially in the Spring the young Leaves are very agreeable; it is raiſed from Seeds ſown in *March*, commonly in Rows or Drills.

Spinage I have already mention'd to be one of the neceſſary Ingredients in raw Sallets, to be cut in the *Ear-Leaf*; but it is of far greater Uſe for boil'd Sallets in *Winter* and the Spring. The beginning of *Auguſt* it ſhould be ſown in ſome place well expos'd to the Sun, that the *Leaves* may be large enough to cut for boiling in the *Winter*; and in *March*, *April* and *May*, we muſt not fail to ſow ſeveral parcels of Ground with it at different times, about a Fortnight diſtant from one another, to ſupply the Table conſtantly 'till other Greens are plenty; for in the Spring one Crop will hardly laſt good longer than a Fortnight without running up to Seed. We have two Kinds of it, the *prickly* Sort, and the *round Spinage*, differing in the Shape of their Seeds according to their Names, but I find no difference in their Taſte when they are boil'd.

Taragon, of all other Herbs, ſhould not be wanting in a *Sallet*, as it is a Cordial Herb, tho' the Taſte of it may not perhaps be ſo grateful to the Palate at firſt as the common Herbs: For my own part, I think it pleaſant, if there is not too much of it; a few Leaves, or three or four of the tender Tops, are enough to give a Sallet an agreeable Reliſh. This *Plant* loves a warm Expoſure, and is propagated from Slips taken from the Root and planted in *March*.

In the Spring, *Dandelion* blanch'd, which may be gather'd almoſt in every plough'd Field, is an excellent Sallet being mix'd with other Herbs. Some likewiſe gather *Violet* Flowers, *Cowſlips*, and the Bloſſoms of *Burrage*, as part of their Sallet Furniture; and in the *Summer* the Flowers of the ſmall *Naſtertium Indicum*. In ſhort, whoever is once acquainted with the different Flavours of the ſeveral Herbs I have named in this Chapter, may eaſily pleaſe himſelf with a *Sallet*.

N. B. Whatever Seeds are ſaved or gathered, muſt be very well dry'd and ripen'd before they are thraſh'd out; and then after cleaning them, muſt be expos'd to the Air and Sun for a Week at leaſt before they are laid up, otherwiſe they will mold and rot.

CHAP. VII.

Of POT-HERBS, *and ſuch as are commonly uſed for* Stilling.

THAT I may not omit any thing that is proper to be done in the *Kitchen Garden*, I propoſe to treat of ſuch *Plants* and *Herbs* in this Chapter, as are commonly uſed for *Stilling*, and are ſometimes dry'd for the Uſe of the *Kitchen*; and firſt of ſuch as are *Aromaticks.*

Roſemary and *Lavender* are both durable *Plants* and *Ever-greens*; they love a light ſandy Soil, and are both raiſed from Slips planted in *April*; quickly taking Root if they are Shoots of the laſt Year, but will not grow if they are older: They are apt to ſuffer by the Froſt, eſpecially if they have too much Wet, and therefore ſhould be planted chiefly in the drieſt Parts of the *Garden*, where they may be the moſt expos'd to the Sun. *Lavender* makes a fine Edging in large Walks, if it be often clip'd; but for the ſake of its *Flowers*, which are often uſed, we muſt have a Plantation of it a-part; for were the Edging *Plants* ſuffered to flower, their Beauty would be ſpoil'd.

Thyme and *Hyſſop* are either raiſed from Seeds ſown in *March* or *April*, or propagated from Slips planted in thoſe Months: We have many ſorts of *Thyme* of various Scents and Uſes; the *Pot Thyme*, *Lemon Thyme*, and a Sort with varigated Leaves are moſt commonly cultivated, and make very good Edgings that will laſt ſeven or eight Years: And beſide them the *Maſtick Thyme*, and the *Marum Syriacum* or *Cat Thyme*, are cultivated in many *Gardens* for the ſake of their refreſhing Odour; but the latter, if it is in ſmall Quantities, muſt be carefully defended from the *Cats*, who love to eat it, and are intoxicated with it; but I obſerve, where it is in abundance the *Cats* never diſturb it. Theſe two laſt Kinds ſhould be planted in the warmeſt parts of the *Garden*, the others will grow any where.

Sage has many Varieties, but we propagate only three ſorts of it, *viz.* The *Red Sage*, the *Tea Sage*, or *Sage of Virtue*, and the *Wormwood Sage*; theſe Kinds are raiſed from Slips taken from the Roots about the beginning of *April*, and planted a Foot a-part in light Earth. The *Sage* of *Virtue* ſhould be cut for drying when it is full of young Shoots, for thoſe only are fit to make *Tea* of; they ſhould be gathered in a dry Day about Noon, and laid to dry in the Shade to be preſerv'd for Uſe. I have been often told, that the *Wormwood Sage* is preferable to the former, affording a pleaſanter Liquor, and more grateful to the Stomach.

We ſeldom meet with more than two ſorts of *Rhue* in our *Engliſh Gardens*, and their difference only conſiſts in the Colours of their Leaves; the one being variegated with Cream Colour, and the other of a plain Green: This *Plant* delights in ſhady Places, and is eaſily multiply'd by Slips ſet in *April* in a light Soil. In times of Peſtilence this *Plant* has been much in requeſt, believing it prevents Infection.

Mint, or *Menth*, and *Baum*, ſhould neither of them be wanting in a *Kitchen Garden*; they are propagated by parting their Roots any time in the Spring, and will grow any where. *Mint* indeed is more generally cultivated than the other, as it is of it ſelf a pleaſant Sallet, and good in Soops and ſome Sauces, beſides its extraordinary Uſe in *Stilling*: When it is about a Foot high, it ſhould be cut to dry in Bunches for *Winter* Uſe, obſerving this as a general Rule, to cut every *Herb* deſign'd for drying in a dry Day, and then to dry them in the Shade.

Some *Gardeners* think it worth their while to plant ſome large Roots of *Mint* in the Corners of their *Hot Beds* about *November*, that they may have young Shoots of it to mix among their *Winter Sallets*.

Tanſie is increas'd by parting the Roots in the Spring, and is a *Plant* ſo valuable, that it muſt not be wanting; ſome of it ſhould always be kept dry in the *Winter*, eſpecially for the Uſe of thoſe who are afflicted with the *Gout* in their Stomach: It is of that ſoveraign Efficacy in that Caſe, as I have found by Experience, that I think I ſhould be guilty of ill Nature, if I was to paſs by this Opportunity of making known the Method of uſing it. Boil half a handful of this *Herb* in half a Pint of ſtrong *White-Wine*, and drinking this Decoction as hot as poſſible; I have always found it to remove the Pain in leſs than a Quarter of an Hour.

Wormwood is either raiſed from Seeds or Slips planted in *March*; it will grow in any Soil, and be apt to over-run the Ground, if it be eaten by Hogs when the Seeds are ripe, which paſſing through their Bodies germinate and come up very quickly.

Penny royal and *Cammomile* are uſeful *Herbs*, and very well deſerve Place in the *Garden*; they delight in moiſt ſhady Places, and proſper beſt in a ſtiff Soil; they are both propagated from Slips planted in *March* or *April*.

We have two Kinds of *Marjoran* commonly propagated in *Gardens*; one Sort called the *Winter Sweet-Marjoran*, which will reſiſt our Froſts, and remain good two or three Years without renewing, and the other is ſown annually upon the *Hot Bed* in *March*, not being able to defend it ſelf from the Violence of our Winters: The firſt Kind is increas'd by planting the Slips about *March* or *April* in moiſt Places, but has not that agreeable Scent which we find in the other; therefore ſome of the laſt Sort ſhould be dry'd every Year when it is grown pretty large.

Carduus is rais'd from Seeds ſown either the middle of *Auguſt*, or in *March*; but I commend the Autumn *Plants* before thoſe rais'd in the Spring, as they are much larger, and more vigorous than the others, and beſides have a much better Seaſon to dry in.

Angelica is rais'd from Seeds ſown in *March* in a moiſt rich Ground; it is a *Plant* that laſts good for ſeveral Years without renewing, and is of great Uſe.

Dragons ought alſo to be found in our *Garden*, as well for the Beauty of the *Flowers*, as the Uſe made of the whole *Plant* in many Caſes; it is multiply'd by tranſplanting the Suckers taken from about the Root in *March*: This *Plant* loves a freſh natural Soil and Shade.

Fennel and *Dill* are both propagated alike from Seeds ſown in the Spring; they are uſeful *Herbs*, and ſhould not be wanting in a *Garden*; the firſt having its tender Stalks blanch'd like *Sellery* makes a very good Sallet.

Parſley and *Clary* are alſo very uſeful Furnitures of a *Kitchen Garden*, both cultivated with great Facility, and rais'd from Seeds ſown in *March*, and renewed every Year.

I have now (I think) mentioned every *Plant* that is requir'd to grow in a *Kitchen Garden*, and would adviſe, that the ſeveral Kinds I have treated of in this Chapter be planted in ſome place near the Houſe, for the Conveniency of gathering them with little trouble when they are wanted.

CHAP. VIII.

Of ENGINES *for raiſing of* WATER, *with ſome Obſervations and Experiments for the meliorating of* Water *for the Uſe of* Gardeners.

AS it is impoſſible to have either a fine or profitable *Garden* without the Command of good *Water*, I am perſwaded this Chapter will not be unacceptable to ſuch Gentlemen as have their *Gardens* unfortunately ſituated remote from it; but eſpecially if by the Aſſiſtance of ſome *Engines*, which I ſhall here mention, they may be taught how to bring it, with little Trouble, to their Houſes or Gardens, altho' they have their Station upon the tops of Hills, or other Places remote from *Water*.

Firſt,

P. 175.

Plate II

Fig I

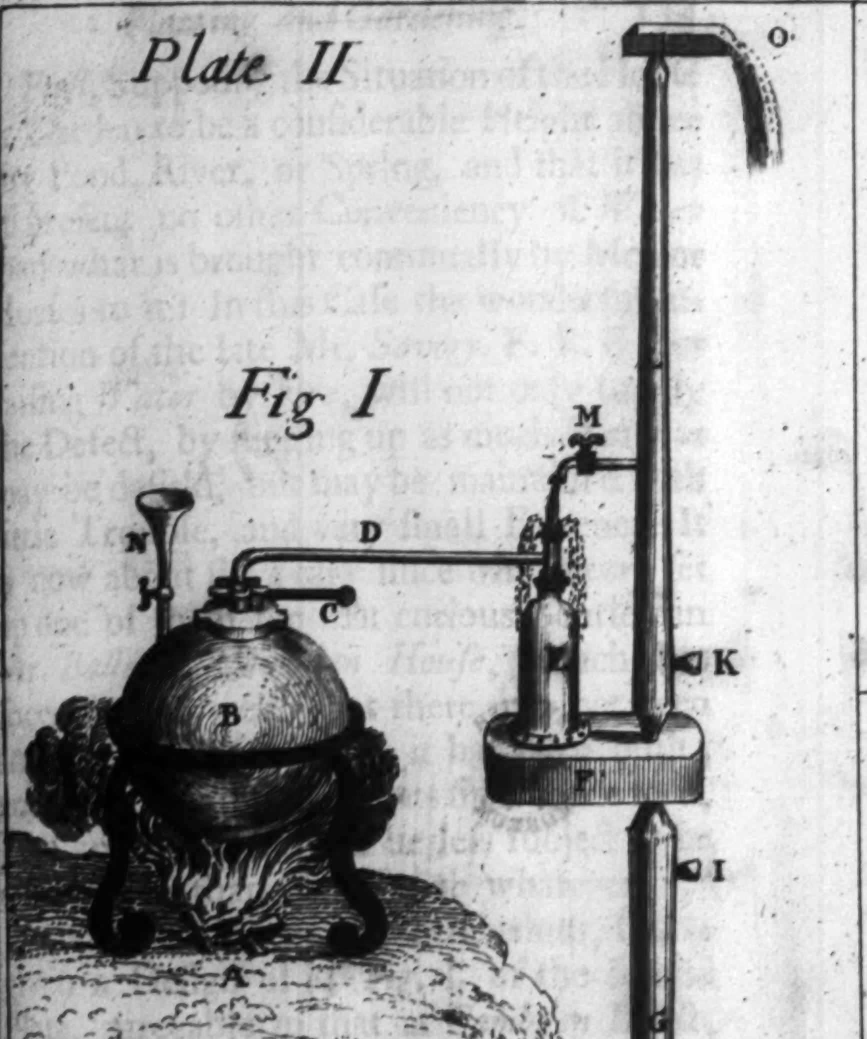


Fig. II.

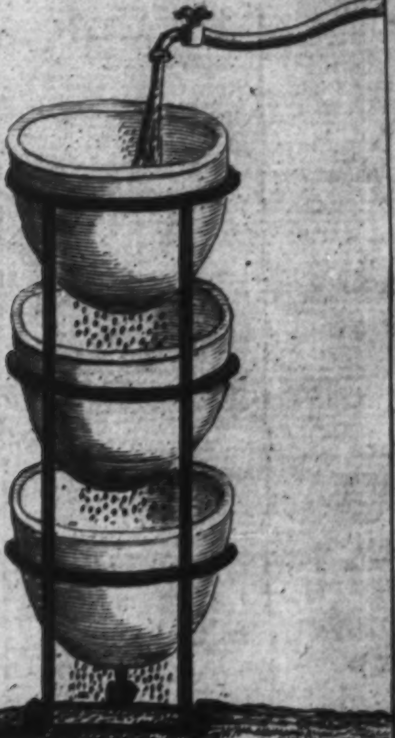
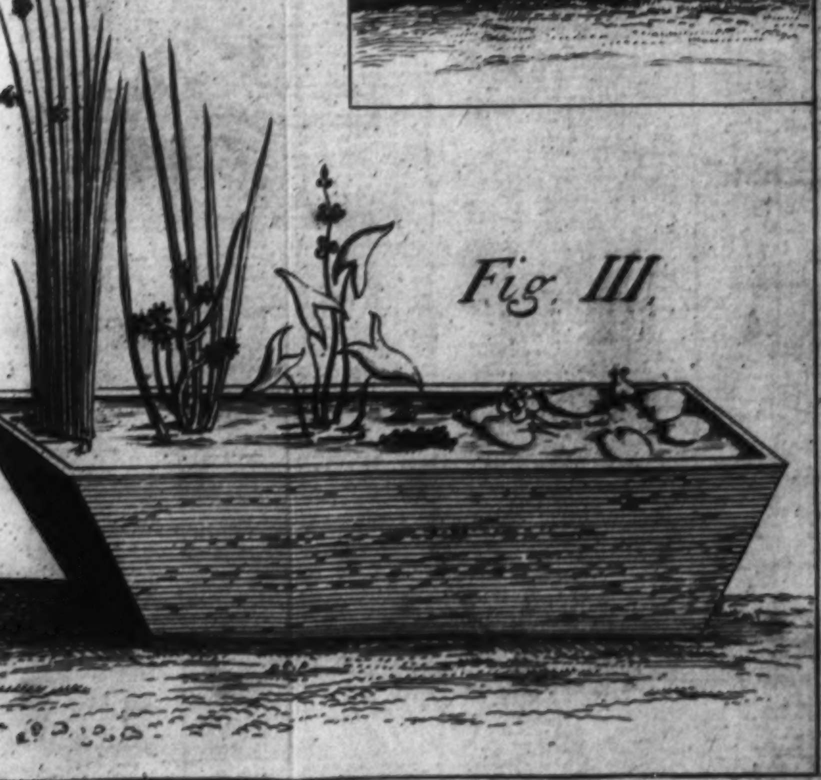


Fig. III.



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Firſt, Suppoſing the Situation of the Houſe or Garden to be a conſiderable Height above any Pond, River, or Spring, and that it has at preſent no other Conveniency of *Water* than what is brought continually by Men or Horſes to it: In this Caſe the wonderful Invention of the late Mr. *Savory*. F. R. S. for raiſing *Water* by *Fire*, will not only ſupply the Defect, by flinging up as much *Water* as may be deſir'd, but may be maintain'd with little Trouble, and very ſmall Expence. It is now about ſix Years ſince Mr. *Savory* ſet up one of them for that curious Gentleman Mr. *Balle* at *Cambden Houſe*, which has ſucceeded ſo well, that there has not been any want of *Water* ſince it has been built; and with the Improvements ſince made to it, I am apt to believe will be leſs ſubject to be out of order than any *Engine* whatever.

For the Satisfaction of the Curious, I have given a Deſign of it, *Fig*. I. of the ſecond Plate, agreeable to that at *Cambden Houſe*, which is, I think, the trueſt proportion'd of any about *London*; the ſeveral Parts of it, and the Manner of working it, I ſhall explain as follows,

A The *Fire*.

B The *Boiler*; a Copper Veſſel of a Spherical Figure, in which *Water* is boiled and evaporated into *Steam*, which paſſes thorow.

C The *Regulator*, which opens to let it into
D The *Steam-Pipe* (of Copper) thorow which it deſcends into
E The *Receiver*, which is a Veſſel of Copper; that at firſt ſetting at Work is full of Air, which the *Steam* will diſcharge thorow
F The *Engine-Tree*, and up the *Clack* at
K (The *Plug* of the ſaid *Clack*, to come at and repair the ſame if need be) and ſo the Air goes up
L The *Force-Pipe.* — After E is void of Air, which is to be found by its being hot all over, then ſtop the *Steam* at C, and throw a litle cold Water on E, and the *ſucking Clack* will open at
I (Which is the *Plug* of the ſaid *Clack*) and fill E with Water, which will aſcend thorow
G The *Sucking-Pipe*, from
H The *Pond*, *Well*, or *River*.

This being done, proceed to raiſe your *Water*, viz.

Firſt, Turn C to let the *Steam* paſs from the *Boiler* into E, and it will force the *Water* therein thorow F by K, up L; which *Water* cannot deſcend, becauſe of the *Clack* at I. When E is thus emptied, which may eaſily be perceived by its being hot as before, turn C and confine your *Steam* in B; then open the *Cock* M, which will let a little cold Water into E, and that by condenſing the *Steam* in E, will cauſe the Water immediately to aſcend from H, and repleniſh E.

Then turn C to let the *Steam* into E, and it will force the Water out of it up L into a *Ciſtern* O, placed at the Top to receive it. Then confine your *Steam* at C as before, and turn M for the ſpace of a Second or two of Time, and E will be refill'd, which may be again diſcharged up L as before: So this Work may be continued as long as you pleaſe, if you keep Water in B.

If you turn the Cock N, and then only *Steam* comes out of it (without hot Water) the *Boiler* muſt be repleniſh'd with freſh Water; but our *Boiler* of Water will laſt a long while.

When you have rais'd Water enough, and you deſign to leave off working the *Engine*, take away all the *Fire* from under the *Boiler*, and open the Cock N to let out the *Steam*, which would otherwiſe (was it to remain confin'd) perhaps burſt the *Engine*.

The Proportion of the ſeveral Parts of this *Engine*, as it now ſtands at *Cambden Houſe*, is thus:

The *Pipe*, from the Surface of the Water to the *Engine-Tree* F, is ſixteen Foot, which is the length it ſucks the Water (but might be made to draw Water about twenty eight Foot.)

From the *Engine-Tree* F, up to the great *Ciſtern*, which receives the Water, is forty two Foot (but might be a hundred Foot high, if ſuch a quantity of *Steam* be allow'd as is proportionable to the length of the *Pipe*.)

The Diameter of the Bore, as well of the *Sucking-Pipe* G, as of the *Force-Pipe* L, is three Inches; and of the *Steam-Pipe* D about an Inch.

The *Receiver* holds thirteen Gallons of Water, and the *Boiler* three times that Quantity.

When this *Engine* begins to work, you may raiſe four of the *Receivers* full of Water in one Minute, which is fifty two Gallons; and at that rate, in an Hour's time may be flung up three thouſand one hundred and twenty Gallons, which is above eighty ſix Barrels: Or if there were two *Receivers*, one to ſuck, while the other diſcharged it ſelf, as has been practiſed, then we might raiſe ſix thouſand two hundred and forty Gallons in the ſame time.

The prime Coſt of ſuch an *Engine* is about fifty Pounds; and the quantity of *Coal* requir'd for each Working is about half a Peck; ſo that the Expence will be very inconſiderable, in compariſon to what the Carriage of Water upon Horſes would amount to; and in ſuch Countries where Wood is plenty, the Expence would be much leſs.

Now if the quantity of Water, which is here ſaid to riſe in an Hour's time, may not be thought enough for the Uſe deſign'd, the ſame *Engine* may either be continu'd to work for four or five Hours, or another of a larger Extent might be ſet up. I have ſeen one with two *Receivers*, which held each of them a Barrel (*i. e.*) thirty ſix Gallons of Water, which would furniſh ſo great a Quantity, that even ſome tollerable large Fountains might be ſupply'd by it.

In the working this *Engine* we may obſerve two things which contribute to explain the Motion of the *Sap* in *Plants*; *Firſt*, We diſcover the violent Elaſticity of *Steam* or *Vapour*, when compreſs'd or crouded into a little room, as the *Steam* or *Vapour* riſing from the Roots of Plants into the fine *Tubes* or *Veſſels* in the Wood, has ſufficient force to *unroll* or *explain* them at their Extremities, and by that means to enlarge the Plant. *2dly*, We may obſerve the Effect of cooling this *Steam*, it then *condenſes* or *thickens* into Water which I ſuppoſe it does in *Plants*, as ſoon as it reaches their extream Parts and meets the Cold, and then returns to the Root thro' other Paſſages big enough to receive it, by means of its own Weight.

The *Perſian-Wheel* is another *Engine* which will draw Water from any great Depth: It is much uſed in *Italy* and other Parts of *Europe*, for drawing Water out of deep *Wells* and *Mines*. This *Wheel* has a Chain of Buckets, which in the time of working are continually filling and emptying themſelves: Some of them going down while the others are coming up, the Chain being looſe like that upon the Wheel of a *Jack*. This I ſhould further explain, if it was not ſo generally known to every one that has been abroad.

As for other Inventions for the ſame purpoſe of raiſing Water, I ſhall refer my Reader to the *Engines* themſelves, that at *Windſor-Caſtle*, the Engine at *Hampton-Court*, but above all others that I have yet heard of for ingenious Contrivance, the *Engine* belonging to —— *Louder*, Eſq; of *Whitehaven*, which I am told is a conſiderable Improvement upon Mr. *Savory*'s Invention.

When by the Aſſiſtance of any of theſe, or other *Engines*, the Water is brought up to the Place deſign'd, it ſhould be expos'd to the Air as much as can be in a Pond, or other Receptacle of the like Nature, which is capable of containing a large Fund of Water, by which means it will be kept from fermenting ſo quickly as it would do in ſmall Quantities, confin'd in *Ciſterns* of *Lead* or *Wood*; and if it ſhould then happen that the Water is not palatable, or very fit for Houſhold Uſe, it may be remedied by ſome of the following Ways.

If it be muddy, or ill-taſted, the Water immediately falling from the Pipe of the *Engine* into the *Pond* or *Receiver*, ſhould firſt light upon a Bed of *Pebble-Stones*, three or four Foot thick; and the *Pond* or *Baſon* it is received into, after it is prepared to hold Water, ſhould be cover'd at the Bottom with the ſame kind of Stone. In that part of the *Pond* where the Pipes receive the Water for its Conveyance to the Houſe, ſhould be laid a Heap of the ſame Stones over the Mouth of the Pipe; and at convenient Diſtances in the Courſe of the Pipes from the *Pond* to the Houſe, ſhould be made two or three ſmall *Ciſterns*, ſunk a Yard in the Ground below the Pipe, fill'd with the ſame ſort of Pebbles, and this Method will purifie the Water to an extraordinary Fineneſs. The famous *Piſa* Water, ſo noted in *Italy*, is not without theſe Helps; but indeed it is obſervable, that the very Mountain it ſprings from produces thoſe *Olives* which make the ſweeteſt *Oil* in the World, which probably proceeds from the Nature of the Soil, as the Goodneſs of the Water alſo is partly owing to.

But for want of theſe Conveniencies, we may refine Water another way, as it is frequently practiſed in *Spain:* They filter it thro' ſeveral *Bells* or *Baſons*, made of a porous Stone of that Country, ſomewhat like thoſe dug about *Oxford*. Theſe *Baſons* are placed one over another, as in *Fig*. II.

Plate II. ſometimes five or ſix, to make the Water as fine as you deſire; but for want of theſe, I think we might uſe large Baſons of ſome ſort of Earthen-ware made in *England*, and baked without glazing, which will let the Water paſs as freely as the *Bells* of *Stone*.

If it is too harſh, ſoften it with *Chalk* and *Gravel*; but above all we muſt obſerve, that no Water-Fowl be ſuffer'd to come near it, nor any Weeds or Fiſh live in it; and alſo that it is not annoy'd by Leaves of Trees falling into it.

And theſe Directions, I think, are not contrary to Reaſon, if we conſider, that the beſt and the worſt Waters are only good or bad, according as they are filter'd thro' *Beds* of different kinds of Earth; all Waters certainly partaking of the Qualities of the Earths they paſs thorow, as it were by Infuſion: It would therefore be well to obſerve what Soils the beſt or moſt pleaſant taſted Springs run thorow, that others may be regulated by them: From ſuch Obſervations an ingenious Man might eaſily alter the Taſte and Quality of any Water according to his own Fancy.

But for the Uſe of *Gardens*, the moſt pleaſant clear Water is not to be prefer'd, nor ſuch as comes immediately from a cold Spring; neither ſhould it be harſh, but rather ſoft and muddy: A ſtagnating Water, that lies well expos'd to the Sun, ſeems to be the beſt for the Health of any Plant; or pure Rain Water, if it can be had without any Mixture; for all enriched or fatned Water, with Dungs or other forcing Ingredients, proves often fatal to Plants, if not rightly underſtood; and at the beſt can only contribute to make a Plant grow ſomething the quicker; and ſuch forcing of Nature always proves of ill Conſequence as well to Plants as to Animals, by ſhortning their Lives.

Indeed where we have to do only with annual *Plants*, it may be of ſervice to uſe ſometimes theſe Provocatives, the better to bring them to Perfection within the compaſs of our *Summer*; but then they muſt be apply'd conſiderately, and a right kind of Mixture prepar'd for each reſpective Sort of Plant: For we muſt not imagine, that one ſort of Mixture, however fatning it may be, will alike contribute to the Welfare of every ſort of Plant. I have experienc'd, that the black Water taken from a Dunghil will make a *Cabbage*, or any of that Race, proſper extreamly: But having uſed the ſame Water to other Plants that were aromatick, and whoſe Texture of Parts was more cloſe, ſuch as *Mirtles*, *Thyme*, and the like, it kill'd them very quickly; which ſhews that the *Gardeners* ought not to confide in the Richneſs of any one particular kind of

Water for the Welfare of every ſort of Plant, no more than a skilful Phyſician will preſcribe always the ſame Medicine for the Cure of all ſorts of Diſtempers.

But there is another thing to be conſider'd in the preparing of Waters for Plants, which as yet ſeems to be very little regarded; and that is, when we mix *Pidgeons*-Dung, or other ſuch like Ingredients in Waters, we muſt allow them due time to ferment before we uſe them, otherwiſe they will injure the Roots we water with them, and that will diſtemper the Plants, and it may be kill them, as we often find by Experience.

Mr. *Evelyn* very juſtly obſerves, ſpeaking of theſe Mixtures, that they ſhould not be uſed 'till they be ſufficiently ſweetned and purged from their over *Acrimony*: I have known many Plants deſtroy'd by the Uſe of unripe Mixtures, altho' the ſame Preparations, when they have been fully maturated, have done Wonders in forwarding the Growth of the ſame kinds of Plants: And again, the Proportions of every Ingredient ought to be as reaſonably conſider'd, and not to double our Quantities over haſtily, becauſe a moderate Proportion has already began to ſhew its good Effects; like ſome unthinking People, who believe that the more Phyſick they take, the more healthful they ſhall be, becauſe they have once been reliev'd from Sickneſs by a ſmall Doſe of it: But a few Obſervations to an ingenious Man, who loves a *Garden*, will ſoon bring him to rights in theſe Matters.

I find that for *Orange-Trees*, *Sheeps* or *Deers-Dung* ſteep'd in Water, about half a Buſhel to a Hogſhead, is of great Uſe, and may be fill'd up five or ſix times without renewing the Dung; but this Water muſt not be uſed 'till it has ſtood at leaſt three Days in the Sun for the firſt time, and about forty eight Hours for the others: And beſides, we muſt likewiſe be ſure to obſerve, that when we have once began to make uſe of it, it muſt conſtantly be continu'd, or the Trees will decline.

I confeſs I cannot from Experience direct any other prepar'd Water for the Welfare of any particular kind of Plant but the *Orange-Tree*; but ſo far as I can judge, thoſe Plants with the largeſt Veſſels, will beſt endure the fatteſt Waters: See the Mixtures I mention for forcing Vegetation in the Third Chapter of my Firſt Part of this Work, and infuſe them in Water for trial.

But to return to plain Water, which is the moſt natural to Plants, uſe only ſuch, if poſſible, as has ſtood in the Sun ſome Days to ſoften, either in *Ciſterns*, or Pits dug in the Ground, but I eſteem Pits to be the beſt; and even Water of this Kind ſhould not be unheedingly given to Plants. We ſhould conſider the moſt proper Seaſons of doing it, and the beſt Method of refreſhing Plants with it.

Firſt then, we ought to water all Plants in the Morning, in ſuch Seaſons when the Nights are froſty; and in the Evening in the warm Seaſons: The Reaſon of the firſt is, that too much Wet lying about the Roots of Plants, chills and pinches them ſo much, if it happens to freeze, that they often periſh; but if it be given in the Morning when there is likelihood of a warm Day, it gives the Plant ſuch Nouriſhment as they require from it, and is dried up before the Froſt of the Evening can have power over it; therefore Morning-Waterings ſhould be in *Auguſt*, *September* and *October*, *March*, *April*, and the firſt fifteen Days in *May*; and from that time to the middle of *Auguſt* chuſe the Evenings for the ſame Work, becauſe then the extream Heat of the Sun would over-heat the Water given in the Morning to the Plants, and ſcall'd their Roots, beſides drying it up too quick, before the Plants could receive due Nouriſhment from it: But we ſhould never uſe theſe Evening-Waterings after the Sun is down, without great Neceſſity.

But in either of theſe Waterings, we ſhould take care to water as near the Ground as can be, and not hold the *Watering-Pot* too high, for that would waſh the Earth from about the

Roots of the Plants, and contribute to make the Ground hard when the Sun comes to ſhine upon it, and ſo bind the Roots too much. Before you water, obſerve always that the Earth be open and looſe about the Roots; and above all, avoid as much as can be the wetting of the Leaves; for if the Froſt comes upon them before they dry, it pinches and rots them; and if the Sun ſhines hot upon 'em while they are wet, they will ſpot and change their Colour.

Beſides theſe Simple Waterings, *Colly-Flowers*, *Cucumbers*, and thoſe Plants which have large Veſſels, ſhould be floated, that is, the *Alleys* between the Rows ſhould be damm'd up at each End, and fill'd with Water; and one of theſe Floatings will do more good than ſix Waterings cloſe to their *Stems*; they feed and nouriſh the extream *Fibres*, which alone want this help, and put the Earth in that Condition, that the ſmalleſt Warmth of the Sun will evaporate that Steam from it, which I account to be ſo neceſſary to plump the Parenchimous Parts of the Leaves and Stalks.

It is a Rule to be obſerv'd in the watering of Plants, That while they are not growing they ſhould be kept as dry as poſſible, and at the time of their Growth they ſhould never want Water, giving them frequently a little at a time, and chiefly at the time they are in Bloſſom; for if by accident of

Weather the Water lies long about the Roots of Plants, it chills them, and checks their Growth. It is alſo to be obſerv'd, that ſuch Plants as are very ſucculent or juicy, as *Houſeleeks*, *&c.* muſt have little Water; they contain Moiſture enough in themſelves for their Nouriſhment, and feed chiefly upon the Air, which they imbibe and condenſe in their ſpongy Parts, and beſides for their Subſtance they have fewer *Sap-Veſſels* than any other Kinds of Plants; therefore I have laid it down as a Rule in my *Hiſtory of Succulent Plants*; and 'tis from Experience, that the more ſucculent is any Plant, ſo does it require leſs Water; and ſo thoſe Plants that have the greateſt Proportion of *Sap-Veſſels*, and the leaſt of ſpongy Parts, require frequent Waterings, which we find to be true from common Experience in the *Garden*, and by examining the Structure of *Water-Plants*, ſuch as *Willows*, *&c.* which are for the moſt part compoſed of *Sap-Veſſels*, and are therefore ſo tough that they may be wrought into any Figure without breaking; but all juicy Plants are brittle for want of theſe Veſſels.

I believe if we were to examine with the *Microſcope* the Numbers and Sizes of the *Sap-Veſſels* in every ſort of Plant we have a mind to propagate, we might come to a Certainty of the Proportion of Moiſture every Plant requir'd.

Since I have now given my Remarks upon *Water*, and the manner of uſing it in *Gardens*, I believe it will not be unacceptable to the Curious, if I give them an Account of the Method I have uſed to propagate *Water-Plants* in *Pots* and *Caſes*, which hitherto I believe has not been practiſed in *England* by any but my ſelf, and is what I find to ſucceed very well.

CHAP. IX.

Of WATER-PLANTS, *whether* Domeſtick *or* Foreign, *the Manner of Propagating them in our Gardens.*

IN the Firſt Part of this Work I have taken ſome ſhort Notice, that we have *Terrene* Plants, *Amphibious* Plants, and *Aquaticks*; but I ſhall now be more particular concerning the latter, and endeavour to ſhew how far the right Diſpoſition of each of them ought to be conſider'd when we are about to propagate them. I am perſwaded, many curious Perſons would have made Plantations of *Water-Plants* in their *Gardens* long ſince, if they had known how to have done it, as the beautiful *Flowers* of ſome of them at leaſt equal, if not ſurpaſs many of our moſt curious *Land-Plants*, and that chiefly in the *Weſt-Indies*; altho' *England* has alſo its Share, witneſs the *Water-Lilles* and *Ranunculus's* of different Kinds, ſo frequently found in our *Rivers* and *Ponds*.

Now that *Water-Plants* may have their place in *Gardens*, even altho' there are neither *Ponds*, *Rivers* or *Springs* to plant them in, I ſhall recommend the following Method, which I have experienc'd with good Succeſs. Firſt, provide either large *Garden-Pots* glazed within ſide, and without Holes in their Bottoms, or elſe cauſe ſome Troughs or Caſes of Wood to be made according to the third *Figure*, *Plate* II. of *Oaken Boards*, about two Inches thick; ſuch Caſes ſhould be ſix Foot long, two Foot wide at the Bottoms, and two Foot and a half deep, if they are for large *Plants* that grow under Water, or ſhallower for ſuch as do not require deep Waters; the Corners and other Joints of ſuch Caſes ſhould be ſtrengthen'd with Iron, the Inſides well pitch'd, and the Outſides painted. In theſe *Pots* or *Caſes* put common unmix'd Earth, ſo much as to fill one third Part of them, for *Water-Lillies*, *Pond-Weeds*, or ſuch others as require depth of Water for their Leaves and Branches to ſwim in, and fill about two Thirds of them with the like Earth for *Wate-Plantains*, *Water-Aroms*, and *Ranunculus's*, which love leſs Depth of Water than the former; then for thoſe *Plants* which grow in *Marſhes* and *Bogs*, the Earth may lie within five Inches of the Top. This Work may be done in *April*, when the *Water-Plants* begin to appear, which may be brought in and planted from that time 'till the middle of *June*, filling up each *Pot* or *Caſe* with Water as ſoon as the *Plants* are put in them. It muſt be obſerv'd likewiſe, that many of the *Water-Plants* are *Wanderers*, without taking any Root in the Earth; ſuch are the *Water-Soldiers*, *Frog-Bits*, and *Ducks-Meat*, which ſwim about from place to place, as the Wind carries them, and only ſtrike their Roots into the Water; therefore a ſmall quantity of Earth at the bottoms of the *Pots* they are ſet in, will ſuffice to maintain the Water in a right State for their Support. In a word, to obſerve the Mode of Growth, and the Expoſure of thoſe *Plants* we collect, will beſt help us to underſtand the right way of Cultivating them with Succeſs, when we are about to civilize them in our *Gardens*; where in all things the plain Road of Nature ſhould be follow'd, or at leaſt kept in view, if we deſire healthful Plants.

I find that in this artificial Management of *Water-Plants*, thoſe of *Rivers* ſhould be frequently refreſh'd with Spring-Water, and ſuch as delight to grow in ſtanding *Pools* or *Ponds*, to be ſeldom interrupted with it. It is alſo obſervable, that *Water-Plants*, upon removing them, will be as long before they recover themſelves to renew their Growth as *Land-Plants*, which may ſeem ſtrange to ſome who are uſed to ſee the ſudden Refreſhment of a decay'd *Land-Flower* when it is put into Water. And whereas it is a common thing to ſhelter *Land-Plants* from the Heat of the Sun after tranſplanting, *Water-Plants* muſt be dealt with directly contrary, and be expos'd to the Sun after they are removed.

The *Seeds* of *Water-Plants* are of two Kinds, one Claſs always ſwiming on the top of the Water, and the other ſinking to the bottom as ſoon as it is ſhed, following the Nature of their Mother Plants in that reſpect: For if the Seeds of thoſe Plants, which naturally ſwim on the top of the Waters, ſhould ſink to the bottom, ſuch Seeds would then be removed from the proper Station requir'd for their Growth, and would therefore periſh: And ſo likewiſe the Seeds of thoſe Plants, which Nature directs to grow under the Water, will not ſwim on the top of it. We may take notice that Providence has ſo wiſely order'd, that in our Climate not any *Water-Plant* is Ever-green, but that they are all of them either Vivacious or Annual, loſing their Leaves down to their Roots, or elſe periſhing entirely, their Seeds only excepted; for there is no Probability of their living and growing in the frozen Waters; and it is therefore the more neceſſary I ſhould ſay ſomething concerning the Preſervation of their Seeds, to ſupply us with the ſeveral Kinds from Year to Year, which without doubt will produce as many Varieties as the Seeds of Land-Plants do every Year; and beſides, the Method which I ſhall preſcribe for the preſerving the Seeds of *Aquatick Plants*, may be uſeful for the tranſporting of them from remote Parts, or foreign Countries, which may be done more eaſily in Seeds than in Plants already grown.

In order to ſave the *Seeds* of theſe *Plants*, we have no more to do than to follow them from the Flower 'till they are ripe, and then to put them in Earth and Water to preſerve them for Vegetation the Spring following, for Nature takes that way, and in this there is no Difficulty. The *Pots* and *Caſes* I have already directed, are proper to put them in as ſoon as they are gather'd; then let them ſink or ſwim in the Water 'till the Spring cauſes them to ſprout, they will proſper with little Attendance; but indeed if we can be happy enough to meet with an ingenious Correſpondent in any Part of *America*, where the Waters ſo generally are adorn'd with beautiful *Plants*, we muſt contrive ſome particular Method to preſerve them during their Tranſportation; and for their Culture when we receive 'em, ſuch as putting them (each Sort by it ſelf) in Bottles of Water and Earth, with large Mouths, cover'd only with Linen-Cloth, and not with Corks, which would cauſe a Ferment in the Liquors: Place thoſe Bottels in ſome Veſſel of Water 'till they can be brought to us, and then ſow them in the Pots, prepared as I have already directed for *Plants* of this Nature, and place them in *Hot Beds* 'till the Weather with us will nearly anſwer the Heat of the Climate they came from. At the gathering their *Seeds*, ſtrict Obſervation ſhould be made of the Depth of Water they grow in, the Situation, the Quality of the Soil under the Water, and whether they inhabit running or ſtanding Waters; and above all, the Taſte of the Waters they grow in, whether ſalt, brackiſh, or freſh, ſhould be obſerv'd; by ſuch Inſtructions I think it will be impoſſible to fail of the Succeſs we deſire.

When we have collected a ſufficient Variety of *Water-Plants* into our *Gardens*, we may prepare to diſpoſe them in *Claſſes*, and range the ſeveral Tribes in proper Order, which would be very uſeful to ſuch as read *Lectures* on *Plants*; for indeed the want of ſome ſuch way as this for the Cultivating of *Aquaticks* in a narrow Compaſs of Ground, has given the Students in *Botany* the greateſt Trouble in their Studies, and has been the Occaſion that *Water-Plants* are ſo little known. The moſt proper Seaſon for diſpoſing and removing them is as ſoon as they are out of Flower, and the Leaves begin to decay, which is about the beginning of *September*; their *Stems* or *Branches* muſt then be cut off near the Root, and their Roots planted at due Diſtances in the *Pots* or *Caſes* already deſcribed.

The *Water-Lillies*, which I ſo much commend for their Beauty, are of ſeveral Kinds; the *Double White*, the *Single White*, and the large *Single Yellow* flowering Sort, which bears a Fruit as large as a *Tennis-Ball*: And beſides theſe, I have heard of ſmaller Sorts of them in *England*, but have not yet found them; the large Kinds bloſſom in *June* and *July*; that with the Yellow Flower ſomewhat ſooner than the others: We may find them in quiet Waters, as in a *Pond* at the Back of *Twitenham*, where I have gather'd three Sorts, but the Yellow Sort eſpecially is very plentiful in the River of *Thames* about *Brentford*, where there are many other pretty Sorts of *Water-Plants*.

In the Ditches about *Lambeth*, and near the *Neat-Houſes*, *Weſtminſter*, I have obſerv'd great Varieties; as alſo near *Hamſted*, and upon the Banks of the *Thames* over againſt *Greenwich*; but I am told there are not in any Place in *England* ſo many different Species as in *Cambridgſhire*, which abounds ſo much in curious *Plants*, that the

Famous Mr. *Ray* thought it worth his while to compoſe a Volume on purpoſe to deſcribe the Plants of that Country only. So that ſuch as covet to propagate *Water-Plants*, may eaſily ſtock themſelves with Varieties enough, which I ſhall never believe are leſs uſeful or beautiful, becauſe they are not ſo high priſed as many others.

I ſhall now ſay little more upon this Head, unleſs it be that we muſt ſhelter ſuch *Water-Plants* as we receive from foreign Parts, in the *Green-Houſe*, during the *Winter*; for it may be in that Seaſon they will flower with us; if they, like the *Exotick Land-Plants*, preſerve ſo far their natural Seaſon of Growth, that they will only ſprout in the Spring-time of their Native Countries. During their Confinement in the Houſe, they muſt be often refreſh'd with Water, ſomewhat warm'd by the Heat of *Horſe-Dung*, or the *Sun*, and allow'd as much Air as poſſible.

OF THE *GREEN-HOUSE*, AND Exotick Plants.

CHAP. I.

Of the GREEN-HOUSE, *or* CONSERVATORY; *with Directions for Sowing* Exotick Seeds, *and the beſt Method of Gathering them abroad for Tranſportation, and the Manner of Packing them up.*

AS there is nothing more difficult in the Management of *Exotick Plants* than the right underſtanding of the *Conſervatory*, where they are to ſtand in the *Winter*, ſo I think it neceſſary in this Chapter to preſcribe ſuch Rules for the building and ordering of *Green-*

Houſes, as I have found to forward the Welfare of *Plants*, and as yet has been but little regarded or underſtood.

The *Green-Houſes*, as they are commonly built, ſerve more for Ornament than Uſe; their Situation to receive the *South Sun*, is the only thing that ſeems to be regarded towards the Health of the *Plants* they are to ſhelter: It is rare to find one among them that will keep a *Plant* well in the *Winter*, either by reaſon of their Situation in moiſt Places, their want of *Glaſſes* enough in the Front, the Diſproportion of the Room within them; and ſometimes where it happens that a *Green-Houſe* has been well conſider'd in theſe Points, all is confounded by the *Flues* under it, which convey the Heat from the *Stoves*.

From the Experience therefore that I have had in the Culture of ſeveral thouſands of *Exotick Plants* in different Kinds of Conſervatories, I ſhall venture to give my Sentiments of the Matter.

Beſide what is commonly call'd a *Green-Houſe*, it has been cuſtomary to provide *Glaſs Caſes* of ſeveral Kinds, and *Stoves* for the Preſervation of *Plants* brought from different Countries; but I now find they are ſo many unneceſſary Expences; a good *Green-Houſe*, well contriv'd, will do all that is requir'd for the Welfare of any Plant in the *Winter*: It may be ſo order'd, as to ſhelter at one time *Orange-Trees*, *Plants* from the *Cape* of *Good Hope*, *Virginia*, *Carolina*, and indeed ſuch as grow within ten Degrees of the *Line*. I muſt confeſs, when I was firſt acquainted with *Aloes*, *Indian-Figs*, and ſuch like *Plants*, I thought they could never have Heat enough, and deſtroy'd many by that too common Notion: I could hardly venture them out of *Hot Beds* in the moſt extream Heats of the *Summer*; and in the *Winter* they were half roaſted with ſubterraneous Fires I had made under the *Glaſs Caſes* where they ſtood.

But the great Inconveniencies I found by that Practice, put me upon making other Trials; I was ſoon convinc'd they would live in the open Air in the *Summer*; and I found that by bringing them acquainted with it in that Seaſon, they became more hardy to reſiſt the Cold of the *Winter*; they were then vigorous and healthful; and I had no more to do in the moſt rigorous Seaſons, but to keep them from the Froſts, and ſo to diſpoſe the *Conſervatory*, that when they came to be ſhut up in ſevere Weather, there might be Air enough enclos'd in the Houſe to circulate freely about the *Plants*, and dry up thoſe Damps which are at ſuch times apt to riſe from the Moiſture of the Pots of Earth; for thoſe Damps I found commonly had the worſt Effects upon Plants, by bringing Moldineſs upon their Leaves or Stalks, which always rotted 'em unleſs timely prevented. To correct theſe, as well as prevent the Froſts from getting into the Houſe in very violent Seaſons, I made uſe of a little *Charcoal Fire*, after it burnt clear and had done ſmoaking, which I hung up between the Windows and the Plants. One of theſe Fires would keep the Air in the Houſe warm and dry for about twenty four Hours, without renewing; and this Method I found had a much better Effect upon the *Plants* than the ſubterraneous *Fires*, which commonly rais'd Damps, crack'd the Paſſages of the *Flues* where it run, and often fill'd the Houſe with Smoak, which is a great Enemy to *Plants*, eſpecially the Smoak of the *Sea-Coal.*

Now altho' I found ſo much Benefit by *Charcoal Fires*, that the laſt hard *Winter* I did not loſe one *Plant*; yet even thoſe Fires are not without their Inconveniencies; where there are many of them, they are ſo ſuffocating that ſeveral Men have been choak'd by them, upon going into the Places where they have been burning; and if they be not made to burn clear before they are put into a Houſe, the Sparks will fly in ſuch great Numbers from the burning Coals, that the Houſe would be in danger from them of being ſet on Fire.

Theſe Inconveniencies indeed are enough to leſſen our Eſteem for *Charcoal Fires*; but it depends upon the Care of the *Gardener* that he avoids thoſe Dangers, by putting into his *Green-Houſe* only a ſmall Fire or two, in proportion to the bigneſs of the Houſe, and by taking Care when he puts them in, that they are rather declining than increaſing in their Heat.

Since I have ſeen ſome of the new invented *Chimneys* ſo judiciouſly improv'd by my Learned and Ingenious Friend Mr. *Diſaguliers*, F. R. S. I am of Opinion, that nothing can be contriv'd more for our purpoſe of preſerving Plants in the *Winter* from Froſts and Damps, than one of them placed artificially in ſome part of a *Green-Houſe*; they will afford us all that we can deſire from any artificial Heat, for the Welfare of *Exotick Plants*, without any Inconvenience attending them; and neither the Trouble or Expence of Firing will be near ſo great as in the preparing of the other Fires I have mention'd; and the Expence perhaps not exceed the Charge ſome have been at in making and continually repairing *Stoves*, which are frequently out of order, beſides the double Advantage we may have from one of them, by ſetting it up in ſome Room joining to the *Green-Houſe*, where altho' a Fire may be kept conſtantly, yet the Heat may be let into, or kept out of the *Green-Houſe* at pleaſure; and that in ſuch Proportions, as to make the Air in the *Conſervatory* equal to the Warmth of any Climate we have a mind to imitate, which we may judge of, by placing a *Thermometer* in ſome part of the *Green-Houſe:* By means of this Invention, the Air in the Houſe will be put in Motion, kept dry and warm, and correct the Damps; the Houſe will be repleniſh'd with freſh Air, as we ſee occaſion, there will be no danger of Smoak, or the Charge of frequent Repairs: So that conſidering all theſe Excellencies, I cannot conceive that any Invention can exceed this for the Preſervation of *Exotick Plants* in the *Winter*. We may ſee a farther Account of theſe *Chimneys* in the Book publiſh'd by Mr. *Deſaguliers*, call'd *Fires Improv'd.*

From hence we may judge that a good *Green-Houſe* ought to be ſituated upon the drieſt Ground, to be as free from Damps as poſſible; we ought alſo to provide ſubſtantially for the keeping out of Cold, and yet upon occaſion to let in Air freely, but chiefly to contrive that the Front of the Houſe be ſo diſpos'd, that nothing may obſtruct the Paſſage of the Sun's Rays in the *Winter* into the Houſe.

I ſuppoſe every one will allow, that the *South Aſpect* is the beſt for a *Green-Houſe*, as it will in that Expoſure receive the Sun for the greateſt part of the Day; but in caſe that cannot be had with Conveniency, the *South Weſt Aſpect* is next to be coveted. I think it would be pleaſant, as well as beneficial to *Plants*, if the *Conſervatory* was always join'd to the Dwelling-Houſe: Can there be any thing more agreeable in the *Winter*, than to have a View from a *Parlour* or *Study*, thorow Ranges of *Orange-Trees*, and curious *Plants* of Foreign Countries, bloſſoming, and bearing *Fruit*, when our *Gardens* without Doors are as it were in a State of Death, and to walk among thoſe Curioſities of Nature, as in the moſt temperate Climate, without any Senſe of the Froſt or pinching Cold that reigns abroad? And beſides, there is this Convenience in the joining the *Conſervatory* to the Houſe, that in cold Weather we may go into it without letting in the cold Air, or blighting Winds from abroad, which would injure the *Plants*.

The Situation of the *Green-Houſe* being thus fix'd upon, the Proportions of the Building muſt next be conſider'd, and that chiefly in relation to the Height and Breadth of the Room; for the Length of a *Green-Houſe* may be more or leſs, according to the Fancy of the Owner: But for the better Admiſſion of the Sun's Rays to paſs all over the Houſe, the Breadth of it ſhould not be more than the Height from the Floor to the Ceiling, which may be from ten to eighteen Foot.

The Walls towards the *North* and the *Eaſt* muſt be of a good thickneſs, but the Front towards the *South* ſhould be all of *Glaſs*, exceping a low Wall about a Foot high from the Ground; there ought to be no Peers of Brick-work or Timbers in the glazed Part, for they caſt more Shade into the Houſe, in Proportion to their Bigneſs, than it can receive Light thorow the *Glaſs*; and every one that underſtands *Exotick Plants*, I'm ſure will allow that they ſhould have all the Advantage of the Sun's Rays in the *Winter* that they can poſſibly receive; and for this End it would be uſeful in the colder Parts of *England* to build the Front of the *Green-Houſe* in a Sweep, after the Faſhion of a Semi-circle, which would then receive the Rays of the Sun from the Time of its riſing, 'till it ſets.

The *Glaſs* in the Front, whether it be in *Saſhes* or *Caſements*, muſt be ſo contrived, that it may either be made to ſlide quite below or above the Frames, or to be taken away as there is occaſion to give Air to the *Plants*, which for about a Fortnight or three Weeks after they are ſet into the Houſe, and as long before the *Plants* come abroad ſhould be quite open Night and Day, if the Froſts or blighting Winds are not abroad; but at other times, while the *Plants* are within Doors, all the *Glaſs* ſhould be put up, and only open'd with Diſcretion in the Day-time to air the *Plants:* The *Saſhes* or *Caſements* being open'd, more or leſs in proportion as the Weather is cold or warm, and ſhould be always ſhut cloſe again before the Sun is off of the Houſe, that the Air in it may keep warm 'till the next Day. Some have practis'd with good Succeſs to lay the Windows of their *Conſervatories* ſloping about ten Inches; but as far as I have experienced, they will do as well upright. The Door ſhould be in the middle of the Front, and at leaſt four Foot wide, to admit large *Plants*; it ſhould be glazed like the Windows.

To theſe we muſt provide ſtrong Shutters, at leaſt an Inch thick, which in the *Winter* time ſhould be ſhut every Night for fear of Froſts, and alſo in extraordinary cold Weather, when violent Winds blow right againſt the Houſe.

For the better Security of the *Plants* from Cold, a Place for the laying up the *Gardener's* Tools may be built at the Back of the *Green-Houſe*, and over it a *Fruitery*, or *Seed-Room*; or in the lieu of the latter, fill the Roof full of dry Straw.

The beſt *Pavement* is that made with ſquare *Tiles*, which ſucks up Wet quickly, and never ſweats as *Marble*, or ſuch Kinds of hard Stone uſually does: And for the Lining of the Walls, nothing is preferable to the *Dutch Glazed Titles*, which are ſoon warm'd with the Sun, and reflect a great Heat into the Houſe.

A *Green-Houſe* being built anſwerable to theſe Directions, after it is well dry'd may receive Plants into it; but nothing injures them more than to ſet them into a damp Houſe. In the placing them in the Houſe, we muſt obſerve the following Particulars.

It is commonly practiſed to provide Rows of Shelves placed one higher than the other, from the *Eaſt* to the *Weſt* End of the Houſe; theſe ſhould be made to hold as many Pots with Plants as will fill up about one fourth of the Space in the Houſe, leaving the reſt for Air to circulate about the *Plants* when they come to be ſhut up cloſe in froſty Weather: For if the Houſe was to be crowded with *Plants* in the *Winter*, their too great Numbers would create Damps, by condenſing the Air in the Houſe; but a quantity of *Plants* proportionable to the Space of the Houſe, as I have already hinted, cannot over-power the Air in it, ſo far as to produce thoſe Damps. It is obſervable, that in Countries which abound in Wood, great Rains are very frequent, which ſeems to inform us, that the cold Nature of the many Trees there growing, and alſo the coldneſs of the Earth under the Trees condenſe the Air, and by that means breed Rain more than other places that are not over burden'd with Woods.

In the diſpoſing of the Shelves in the *Green-Houſe*, I allow one Third of the

Floor for them to ſtand upon; one Third from the firſt Shelf to the Windows, and as much from the laſt Shelf to the Back of the Houſe; ſo that we may walk round the *Plants*, which being placed in the middle Line of the Houſe, are ſafe from the extream Cold, which is generally nearer the Walls or Glaſſes.

Between the Windows and the firſt Shelf, at one End of the Houſe, ſhould be built the *Chimney* for warming the Air, and the Heat made to come from it into the Houſe, about a Foot above the Floor, which will riſe afterwards, and ſpread it ſelf over the Whole. Near the Place where this Heat comes in, place the moſt tender *Plants*; and by degrees, at greater diſtance from it, the moſt hardy. We may beſt judge of the Nature and Temper of *Plants*, by conſulting what Climates they were brought from; as for example, thoſe which come from Countries near the *Line*, muſt have the warmeſt place; if they grow on this ſide the *Line*, their Spring begins about the ſame time with ours; but if they were brought from the *South*-Side of the *Line*, then their Spring begins about *Auguſt*. All *Plants* of the *Cape of Good-Hope*, and other Parts beyond the *Line*, ſuch as *Aloes* of thoſe Countries, *Ficoides*, and ſuch like, flouriſh moſt with us from *Auguſt* 'till the End of *November*, 'till the Cold of our *Winter* checks their Growth.

All ſeedling *Plants* from hot Countries, which we raiſe in the Spring upon *Hot Beds*, ſhould be uſed to the Air as much as poſſible when they are once come up, for elſe they will hardly ſtand the *Winter*, tho' they are ſet in the warmeſt part of the *Green-Houſe*; but there will be little Danger of loſing any of them after they have been preſerved twelve Months, and have had the Trial of all our Seaſons.

I obſerve that the *Plants* which I have raiſed from *Seeds* brought from *Jamaica*, *Barbadoes*, *St. Chriſtophers*, and from others of the *Caribbe*-Iſlands, are the moſt tender, and hard to be kept: But I am perſwaded a Houſe built after the manner I have directed, with the Addition of one of the *Chimneys* I mention, would keep them, or any other, with very little Trouble.

Plants from *China* are indifferently hardy, as well as thoſe from *Perſia*; and I find that moſt of thoſe brought us from the *North* of *Carolina* and *Virginia*, whoſe Seaſons are but a little earlier than ours, and the difference of Latitude not more than twenty five Degrees *South* from *London*, may be naturalized without Difficulty to our Climate, after they have been ſhelter'd for two or three *Winters* with us: Witneſs that Wilderneſs of *Exotick Plants*, which that wiſe Encourager of Natural Learning, the late Biſhop of *London*, cauſed to be planted in his *Gardens* at *Fulham*, and have proſper'd ſo well without Shelter for ſeveral Years.

The Time for ſetting *Exotick Plants* into the Houſe is about the ſecond Week in *September*; and the middle of *May*, if the Froſts are paſs'd, they are commonly brought out of the Houſe: But altho' this is become a general Rule (in a manner) among the *Gardeners*, we muſt yet take this Caution with us, that all Plants are not alike tender; *Orange-Trees*, and moſt Plants of *Virginia* and *Carolina* are indeed rightly ſet in and out of the *Green-Houſe* at thoſe times; but *Myrtles* may come abroad ſooner by fifteen Days, and remain out of Doors 'till the middle of *October*. Again, *Aloes* ſhould not be brought out of the Houſe 'till the firſt Week in *June*, and ſet in again about the laſt Week of *Auguſt*; and ſuch *Plants* as live neareſt the *Line* ſhould yet be more confin'd to the Houſe than any I have yet mention'd: But concerning the Houſing and Bringing abroad of all ſorts of *Exotick Plants*, we muſt be ſure to obſerve this General Rule, *i. e.* that they muſt be perfectly free from Wet on their Leaves and Branches when they are ſet into the Houſe; and we muſt always bring them abroad, if poſſible, with the Advantage of a gentle Shower, to waſh and refreſh their *Leaves*.

It next follows that I deſcribe the Manner of raiſing *Exotick Plants* from *Seeds*, and that ſhould be done in this manner; When by Means of Correſpondents in Foreign Countries, or the Help of Curious Perſons at Home, who have by their Induſtry collected the *Seeds* of Foreign Novelties, we are provided with a Collection of *Seeds* from any hot Country, we muſt preſently prepare a *Hot Bed* for them; and while it is ſettling it ſelf for Uſe, ſow the *Seeds* in *Pots* ſeparately, marking every Sort, that when they begin to come up, we may the better know what we are to expect. When they have made their firſt *Leaves*, plant them out in other *Pots*, and give them a freſh *Bed*, when the firſt is cool, and as ſoon as the ſecond begins to decay, uſe them to the Air in the Day-time to harden them for the *Winter:* If by chance all the *Seeds* we ſow do not come up, keep the *Pots* they were ſown in 'till the Spring following in the *Green-Houſe*; for many *Seeds* will lie in the Ground 'till the ſecond Year without ſprouting, as I have often found, and they always prove to be *Trees*.

And that we may with the more Certainty propagate ſuch *Exotick Plants* from *Seeds*, I think it may not be amiſs to conſider the moſt proper Method of Gathering them in Foreign Countries, and packing them up for Tranſportation, that what *Seeds* we receive from Abroad may not loſe their *Geminative* Faculty before they come to us, or be deſtroy'd by *Inſects*, which often happens.

I would adviſe then, that all *Seeds* gathered abroad, which are deſign'd for Tranſportation, but eſpecially if they are to undergo a long Voyage, ſhould be cut from the *Plant*, with part of the *Branch* they grow upon, a little before they are going to ſhed or drop from the *Plants*, and in that manner laid in the *Sun* to dry thorowly before we offer to pack them up, for the leaſt Moiſture will rot the Seeds: All *Beans*, *Peaſe*, and Codded *Fruits* ſhould remain in their *Seed-Veſſels*, which will afford them ſome Nouriſhment, and preſerve them from the Injury of the Sea Air, which is pernicious to *Land-Plants*. *Fruits*, ſuch as have a *Pulp* or *Fleſh* over their *Seed*, ſhould be dry'd, if poſſible, with their *Fleſh*, and the Stalk or Part of the Branch they grew upon adhering to them; for Nature has provided proper Coverings for every Seed to defend it from Injuries, and for its Nouriſhment, 'till it is fit for the Ground: At the Gathering of every *Seed*, Notice ſhould be taken of the Soil, and the Situation, whether *Sand*, *Loam*, *Clay* or *Rockey*; the Side or Top of a Hill, whether Boggy-Ground, either expo'd to the Sun, or in ſhady Places, if under Trees, or in Plains; this is ſo very ma-

terial,

terial, that I know ſome *Plants* will not grow any where but in Woods, and there only under particular Kinds of Trees, as ſome of the *Orchis* Kinds for example, which I have often try'd to propagate in my *Garden* to little purpoſe. When a ſufficient Collection of *Seeds* is gather'd, and well dry'd, put each Sort by it ſelf into Paper, with its Deſcription, Time of Flowering, the common Names they bear among the Country People, and the Uſe they make of each Kind; then put the Papers cloſe together into Glaſs-Veſſels, or Stone or Earthen Pots well glazed, and ſtop'd down cloſe, with Pitch or Rozin melted over the Corks or Stopples: Theſe being ſo order'd, ſhould be put into a Box, filling up the Spaces between them with dry Sand; and then after the Box is well ſecured, ſet it in ſome dry place of the Ship.

The ſmalleſt Kinds of Seeds, and ſuch as are of the leaſt Subſtance, ſhould be put into dry Sand, in ſeparate Parcels, according to their Kinds, for otherwiſe they would ſhrink for want of Air, which they ſhould, as much as poſſible, be debarr'd from while they are upon the Sea. All bulbous Roots ſhould be taken out of the Ground when their Flower-Stalks begin to decay; and when they are well dry'd may be pack'd up with dry Sand in Glaſs or Stone Veſſels.

But if it could be compaſs'd to ſend over *Plants* already growing, plant them four or five Inches aſunder in Boxes, having firſt pruned off their Branches; between them plant the bulbous Roots, and over the whole ſprinkle ſome *Seeds* of the ſmalleſt Kinds, and then make a Cover of Hoops or Latice-Work to put over the Box, which will defend the Plants, while they are at Sea, from the *Rats*, and give a free Paſſage for the Air and Sun to come at the *Plants*. And to be yet more certain of their Welfare, an outſide Caſe of Boards, nail'd cloſe together, may be made to put over the Box in hard Weather, to defend the *Plants* from the Sea-Water: Theſe Boxes ſhould not be very deep, leaſt they hold the Wet too long about the Roots of the Plants: To avoid which, there ſhould be Holes at the Bottom for the free Paſſage of the Water, which the Plants ſhould have in ſmall Quantities when the Earth began to dry, which perhaps may be in twenty four Hours in ſome Climates, and not in three or four Days in others. *Plants* pack'd in this manner ſhould ſtand upon *Deck* if poſſible.

Thus having laid down the General Rules for the Ordering of a *Green Houſe*, and the *Plants* to be ſhelter'd in it, I ſhall in the next place proceed to give particular Directions for the *Culture* of ſuch Kinds of *Exotick Plants* as merit moſt our Pains and Admiration.

CHAP. II.

Of ORANGE *and* LEMON-TREES, *and their* Culture.

THERE is little difference in the manner of ordering the *Orange* and *Lemon-Tree*; and ſeeing that theſe Kinds of *Plants* are ſo beautiful in every reſpect as to merit an univerſal Eſteem, I ſhall therefore be more curious to lay down ſuch Rules for their Management, as may every way contribute to their Improvement; and firſt of *Orange*-Stocks, which are brought from *Genoa* and other Foreign Parts.

The moſt proper Seaſon for the Importation of *Orange* Stocks into *England*, is in *February*; ſo that at leaſt there ſhould be a Fortnight in that Month to prepare them for Growth, that their Shoots may be vigorous and ſtrong the ſucceeding Summer. When we receive them from Abroad they have very little Root, and leſs Branches; and as they have commonly been laid up in that Condition in dry Boxes for ſome time before we receive them, they require no ſmall Care to recover them from their Lethargy. I firſt adviſe that they be laid upon wet Moſs, in ſome large Room, where they may have the Advantage of as much Air from abroad as may be (provided if it be not too ſharp) in the Day-time only for about a Week; this Method, if they are turn'd once in twelve Hours, will recover their ſhrunk Veſſels, and ſwell their Bark; then their Roots muſt be examin'd, and their wounded and dead Parts cut off with a very ſharp Knife; and of the Earth about them, if they have any, very little taken away; their ſmall remaining Tops muſt likewiſe be prun'd off, leaving only ſuch Shoots as are vigorous about three or four Inches long, and all the Wounds of them cloſely plaiſter'd over with ſoft Wax: In this State their Roots muſt be laid in River or Pond Water for about twelve Hours, and ſet to drain for about half an Hour after they are taken out, before they are planted.

The Pots for theſe Stocks muſt be juſt big enough to admit of two Inches thick of the following Earth on every ſide their Roots and no more, leaſt the Warmth of the *Hot Bed* they are to be ſet into, has not ſtrength enough to reach them and make them ſtrike, for the *Hot Bed* muſt be very moderate and gentle, leaſt the Roots are ſcorch'd, and then it will be to little purpoſe ever to attempt the Recovery of the Plants.

The Earth which I have made uſe of with ſucceſs was one third part of rotted Wood, one third of freſh ſandy Loam, and as much *Melon*-Earth well mix'd and ſifted together; this Soil I always found to make my Trees proſper and produce excellent Fruit.

The Stocks being in this State, their Pots ſhould be ſet upon a *Hot-Bed* prepared as directed in *Chap.* I. of the *Kitchen-Garden*, when the great Heat is paſt, after the whole Surface of the *Bed* is cover'd with Mold, to prevent the Steam of the Dung riſing and annoying the Plants.

This *Bed* ſhould be made under a warm Wall, and ſhelter'd from the cold Air with Glaſs on the Sides and on the Top: The *Plants* being thus prepar'd for Growth, muſt be moderately water'd about once a Week 'till *April*; and then, if the Weather be very warm, every third Day. It is alſo to be obſerv'd, that at all ſuch times as the Sun ſhines warm upon them, their Tops muſt be ſhaded with *Mats*, leaſt the tender Shoots, which began to put forth, be ſcorch'd, and by that means periſh.

In *May*, when their Shoots begin to ſhow their Vigour, it will be neceſſary to give them Air by degrees, by opening the Glaſſes towards Sun-ſet, if the Evenings are not too cold; this, if it be done judiciouſly, will contribute to ſtrengthen them, and make them ſhoot green and healthy. During the Courſe of their firſt Shoot they muſt be ſhifted every ſix Weeks, at leaſt into freſh Hot-Beds; but as ſoon as *June* is paſt, I would not then adviſe any more Forcing, but rather endeavour to prevent them from ſetting out a ſecond Shoot, by expoſing them at large to the open Air in ſome place ſhaded from the *Sun*, where they ſhould remain 'till the firſt Week in *September*, and then carry'd into the *Green-Houſe*; at which time, three or four Inches of the Earth on the top of their Pots ſhould be carefully taken away, without injuring the Roots, and as much freſh Mold put in its place.

The *Orange-Trees*, being thus ſeated in their *Winter* Habitation, ſhould have as much Air as poſſible allow'd them, Night and Day, 'till the latter End of *October*; the Windows of the *Green-Houſe* ſhould never be ſhut during that time, unleſs the Winds or Froſts happen to be very ſevere; and in the following *Winter*-Months, when the Weather is moderate, no Opportunity ſhould be let paſs of opening the Houſe.

Theſe *Trees*, altho' they love the Shade, yet quickly periſh if they have much Water; let them be frequently refreſh'd with it a little at a time, leaſt too much Wet about their Roots chill or rot them, and deſtroy the *Plants*. I find that *Sheep* or *Deer* Dung, ſteep'd in the Water for *Orange-Trees*, contributes to make them healthy. The Effect which violent and haſty Waterings will have upon theſe *Trees* will be, that the Leaves turn yellow, and often drop off; and above all will remain for a Year or two languiſhing, without putting forth any Shoots, and at length entirely go off. Now if by theſe, or ſome better Directions, a *Gardener* maintains his new *Orange-Trees* in good Health 'till the latter End of *February*, let him then renew the Earth as he did in the fore-going Autumn, and trim the Heads of his *Plants*, leaving ſix Inches or thereabouts of the preceeding *Summer*-Shoots, if they be ſtrong, or leſs in Proportion, as they are otherways, plaiſtering the Wounds with ſoft Wax, as I have before directed; they will, after this Operation, ſoon begin to ſprout, and make good Shoots the *Summer* following, if they are diſcreetly made acquainted with the External Air before they are ſet out of the Houſe.

It is commonly practis'd to bring them abroad about *Mid-May*, eſpecially if moderate Rains fall at that time: And I have known it laid down as a Rule, to ſet them out of the Houſe when the Leaf of the *Mulberry-Tree* is as large as a *Crow's* Foot, which perhaps may be a certain Sign of the ſettled Temperature of the Air. I have indeed my ſelf had little Regard to either of theſe Rules, but have chiefly truſted to the Time of the *New Moon* in *May*, which I obſerve commonly brings gentle Showers, and warm Weather.

For the *Summer* Station of theſe *Trees*, it is adviſable to provide ſome ſhady place in the *Garden*, either by fencing it in with Hedges of *Dutch Helm*, *Hornbean*, *Holley*, or *Evergreen Oaks*, about twelve or fifteen Foot high, or elſe to clear ſome place in the *Wilderneſs* or *Wood* to ſet them in, ſuch as may be ſeen at the Right Honourable the Earl of *Eſſex*'s at *Caſſioberry*, and ſome other Places; for in ſuch Shelter this *Plant* delights exceedingly. With this way of Management we may expect handſome Trees in three Years from their firſt Planting, minding to change their Pots as the Roots increaſe in bigneſs; which Work is beſt done in *February:* And let the *Gardener* take this Advice along with it, that he always plant theſe *Trees* ſo ſhallow in their *Pots* or *Caſes*, that none of the *Stem* be ſet below the Earth, but rather let ſome of the large Roots joining to the *Stem* be ſeen above it; and alſo that the Pots be not too large, for then the Roots would chill, by having too much Moiſture about them.

The third *Summer* after planting, the *Trees* will begin to bloſſom, and if they are in Health will ſet Fruit, which will be as big as a Muſquet-Ball when they are put into the Houſe, and ripen the *Summer* following.

No skilful *Gardener* will ever covet great quantities of Bloſſoms, as they are certain Signs of Weakneſs, and a Fore-runner of Decay, unleſs timely prevented by pruning many of them off as ſoon as they begin to appear.

That great Encourager of Ingenuity, the late King of *France*, was ſo great an Admirer of this *Tree*, that he continually had Rows of them flowering in a Gallery of the *Louvre*; they were placed upon *Pedeſtals*, with Caſes of emboſs'd *Silver* over their Pots. I leave my Reader to imagine the Pleaſure of ſuch Furniture, which was never wanting as well in *Winter* as in the *Summer*. The Manner of bringing the *Trees* to bloſſom at every Seaſon was thus; after the *Gardeners* had choſe a Number of Trees ſufficient for their Uſe, they let them remain without Water 'till their Leaves drop'd off; and then giving them freſh Earth on the Tops of their Pots, and frequent Waterings in a Glaſs-Caſe, they came out full of Flowers and freſh Leaves, fit for the Place they were to ſtand in; theſe they renew'd every Month throughout the Year; and the like Curioſity was alſo in the Palace of the Prince *di Burgeſi* in *Rome*.

The Situation and Climate natural to this beautiful *Tree*, may be conſider'd in the next place; and may ſomewhat help us to judge of the Temper and Nature of the Air it requires:

quires: The firſt Groves of them that we meet with growing wild in *Europe*, are at *Eres* near *Thoulon* in *France*, which is between forty two, and forty three *Degrees Latitude*; and about *St. Remo*, and the *Riviera* of *Genoua* in the ſame *Latitude*, near the Sea, at the Foot of very high Mountains to the *North* of them; and the firſt Woods of them growing in *Italy*, are as far *South* as *Gaietta*; and ſo agreeable is the Air of the Sea to them, that in many Places more remote from the Sea than *Thoulon* and *Gaietta*, altho' farther *South*, they cannot be made to thrive without Shelter in the *Winter*.

The various Kinds of *Oranges* and *Lemons* would make a very conſiderable Article, if I was to mention each Sort in particular, and indeed would be of little Uſe; I ſhall therefore only mention ſome few which are the moſt common in our *Engliſh* Gardens. The *Civil-Orange* is, in my Opinion, the beſt, as well for the Beauty of its *Leaves*, as for the Goodneſs of its Fruit, which will come to Maturity with us. The *China-Orange* never makes a handſome *Tree*, but is always inclining to look ſickly, and ſeldom bears Fruit in Perfection. The *Curl'd Genoua Orange* is ſomewhat more pleaſant to the Sight, but is a very ſlow grower: And the *Strip'd Genoua*, for the beautiful Variegations of its Leaves, may well enough be introduced as a Rarity; but for its Fruit I have never yet ſeen it fit for any Uſe.

The *Portugal Lemon*, and the *Lime*, bear good Fruit, which will ripen ſo well with us, that I have gather'd as good from my own Trees as any that have been brought from abroad: Some *Citrons* and *Shadocks* have by chance ripen'd in *England*, but they are hardly worth our Trouble: However, if in any Collection they happen to be found, the *Gardener* ought only to obſerve, that as they, and all the *Lemon Race* will grow much quicker than *Oranges*; ſo their Pots or Caſes ought to be larger, and their Watering more frequent; to which I ſhall add, as a certain Rule, that pruning their Branches muſt be avoided, as much as poſſible; for I have known ſeveral Trees ſpoiled by it.

Now altho' I have given Directions for the Management of large *Orange-Trees*, which are brought us from Foreign Parts, and have, by means of the Method I have laid down, eat very good Fruit, which they have produced; yet I find by Experience that the *Orange-Trees* raiſed in *England* from Kernels, are more hardy, and will bear Fruit with more Certainty, and in much greater Quantities, with leſs Trouble; and therefore I ſhall inform my Reader of the Method which I practiſe to raiſe them from Seeds.

In *February* I prepare a *Hot Bed*, in which (as ſoon as the burning Heat is paſt) I place ſeveral Pots fill'd with light dry Earth, and ſow the Seeds of *Oranges* and *Lemons* in them, about an Inch deep, where they will remain about ten Days before they appear above the Earth; give them little Water 'till they come up, leaſt you rot the Seeds; for when they are taken freſh from the Fruit, the outward Membranes, which encloſe the Seeds, are always cover'd with a kind of *Mucilage*, which will remain moiſt for ſeveral Days, and is ſufficient, with the addition of a ſmall Heat, to make the Seeds ſprout, as an Obſervation of the Curious Mr. *Anthony Van Leuwenhoek* ſufficiently proves. He ſays that he took a litte *Copper Box*, and put ſome Sand into it, which for its whiteneſs, and becauſe it is uſed to ſcour *Tin*, is call'd *Scouring-Sand.* He adds, this *Sand* was very dry of it ſelf, but was ſomewhat moiſten'd by the *Seeds* he put into it, having newly taken them out of an *Orange*; this he did in *November*, and carry'd the *Box* ſhut cloſe in the Day-time in his Watch Pocket, and at Night had it put in a Veſſel of hot Water, by which Means the *Box* was conſtantly kept warm: The ſixth Day he open'd it, and found that the *Seeds* had already put forth Roots, near half an Inch in length; and from time to time, as he review'd them, found them increaſe and put out Branches. This Experiment of Mr. *Leuwenhoek* indeed was made by him for a much greater End than what I now uſe it for: He endeavours to prove by it, that every Part of a *Plant*, as well their *Leaves*, *Flower* and *Fruit*, as their *Roots* and *Branches*, are all contain'd in the *Seeds*; and that their Germination is only the filling and explaining the minute Parts wrapt up in their *Seeds*, and not from any additional Parts they receive from the Earth they are planted in. But ſee this Curious Gentleman's further Remarks on this Head, in *Philoſophical Tranſactions. Numb.* 287.

But to return to my Deſign; I would rather adviſe the Sowing of *Lemon* or *Citron-Seeds* than thoſe of *Oranges*; for ſince neither of them will bear Fruit 'till they are either grafted or inoculated, and the *Lemon*-Stocks will as well receive the Buds of *Oranges* as thoſe of its own Kind, they ſhould be prefer'd for the ſake of their quick Growth and hardy Conſtitution. Now as theſe *Seeds* will riſe at leaſt four Inches high during the Warmth of their firſt *Hot-Bed*, let their Pots be ſhifted every five or ſix Weeks into freſh *Beds* 'till about *Auguſt*, and then begin to harden them for the *Winter*. I have ſeen *Lemon-Plants* rais'd after this manner, that have been near three Foot high the firſt Year; for growing together in little Groves, each *Plant* has a kind of Emulation to over-top the reſt, as if they knew the ill Conſequence of ſuperior *Plants* dripping upon them. I have already hinted how much Shade contributes to the Growth of *Plants*, but ſhall once more re-mind the *Gardener* to defend theſe young *Plants* from the hot Summers Sun, and give them Air only Mornings and Evenings.

The *February* after they are raiſed they ſhould be tranſplanted into ſmall Pots, and be put again into a *Hot-Bed*, 'till the Seaſon is ſufficiently warm to ſet them abroad; and in *July* ſome of them will be fit to *Inoculate*, and the reſt to *Inarch* the *May* afterward.

The moſt proper Seaſon for *budding* theſe *Trees* is about the tenth of *July*, at that time the *Buds* will readily grow; and the following Spring all the wild Part of the *Plants* above the *Buds* being cut off, and the Wounds cover'd with ſoft Wax, we may expect a good bearing Shoot of a Foot long at leaſt, before *Winter*, if they have the help of a *Hot-Bed*; and in two Years afterward they will begin to bear Fruit if they are well look'd after, and are not over potted.

But *Inarching* them is yet a much quicker way to make them bear both *Flowers* and *Fruit*; this Work is done in *May*, and by the latter End of *Auguſt* following, they may be cut off; they will then have Fruit upon

them,

them, either green or ripe, as you made choice of bearing Boughs to inlay into the wild Stocks. I have heard of Trees, that in leſs than two Years, from the ſowing of the *Seeds*, has had *Fruit* upon them by this Means; and I have my ſelf raiſed an *Orange-Tree* after this manner, that had *Fruit* and *Flowers* upon it when it was not ſix Inches high. Mr. *Fairchild* at *Hoxton*, by a peculiar Method he has in performing this Work, has now ſome hundreds of little *Orange* and *Lemon-Trees*, with *Fruit* upon them as large as any that is brought from abroad.

As I have now given ſuch Directions for the Management and Improvement of *Orange* and *Lemon-Trees*, as I have my ſelf practiſed with good Succeſs, I doubt not but ſuch as are cultivated by theſe Rules will not be leſs vigorous and healthful, and for ſome Particulars relating to the preſerving them from Froſts and Damps in the *Winter*: See the foregoing Chapter of *Green-Houſes*.

CHAP. III.

Of MYRTLES, JESSAMINS, *and* GERANIUMS, *their* Culture, *&c.*

WE have many ſorts of *Myrtles* in our *Engliſh Gardens* diſtinguiſh'd by the following Names: Thoſe with the largeſt Leaves are the *Orange-leav'd Myrtles*, the *Spaniſh Broad-Leaf*, the *Portugal-Myrtle*, the *Nutmeg-Myrtle*, and that with the double Bloſſom: Beſide which, we have the *Nutmeg-Myrtle* with variagated Leaves, which is accounted a Rarity.

Thoſe with ſmaller Leaves are the *Upright-Myrtle*, the *Silver-leav'd Myrtle*, the *Box-leav'd* and *Birdſneſt-Myrtles*, and the *Roſemary* and *Thyme-leav'd* Kinds. All theſe, except the *Orange-leave Myrtle*, and that with the double Bloſſom, are very eaſily propagated by Cuttings; but thoſe two Kinds are much better encreas'd from *Layers*.

The moſt proper Seaſon of laying *Myrtles* for Encreaſe, is in *May*, when the youngeſt Shoots only, ſuch as are tender, ſhould be bent into the Earth after it is well ſtirr'd;

and thoſe, if they are often refreſh'd with Water, will ſtrike Root, and be fit to take off from the Mother Plants the Spring following; but if we lay down Shoots of a Year old, they will never ſtrike Root with all the Art you can uſe: So we muſt likewiſe obſerve, that the Cuttings we deſign to plant ſhould always be young and tender, ſuch as we find upon the *Myrtles* in *July*; 'tis then the moſt proper Seaſon for planting them, ſtripping off the Leaves two Inches from each Cutting, and ſetting them that depth, about an Inch a-part, in Pots of fine light Earth, watering them frequently 'till they have taken Root, which will be about the latter end of *Auguſt*. This young Plantation ſhould remain 'till the ſecond *March* before they are tranſplanted into ſingle Pots, for to remove them ſooner would endanger them, becauſe then their ſmall tender Roots would not be ſufficient to draw away the Moiſture of the Earth about 'em ſo quickly as one would wiſh, and then it would chill the Roots. However, when they have once got large Roots, they delight in Water, and ſhould be frequently refreſh'd with it: They covet the Shade in the *Summer*, and will by means of that Help make much ſtronger Shoots than thoſe that are expos'd to the *Sun*.

About *Mid-April* ſuch old Trees as have been neglected and have thin Heads, may be pruned about the Roots, and freſh Earth put to them, and have the Branches of their Heads cut within three or four Inches of the *Stem :* Being thus order'd, they will prepare for ſhooting by that time they come abroad, and make handſome Plants that Summer, if they have Water and Shade enough.

The *Myrtle* delights ſo much in Moiſture, that I have known a Pot of it ſet in a ſhallow Baſon of Water, withinſide of a Window expos'd to the *South*, that has ſhot above four times as much in one Summer as any that have ſtood abroad, and has continu'd growing at that extravagant rate for ſome Years, without renewing the Earth in the Pot, by only taking care to ſupply the Baſon with freſh Water as it wanted; but the Shoots of this *Plant* were very ſlender.

In diſpoſing of theſe and other *Plants* in the Shade, we muſt not ſuffer any Trees to drip upon them, or confine them in too cloſe a place, they muſt have the free Air round about them and above 'em, or elſe the Shoots they make will be ſlender and weak.

The next *Plant* I ſhall take notice of is the *Jaſmin*, of which we have many ſorts which will not bear the Cold of our Climate, and are therefore ſhelter'd in the *Conſervatory* during the *Winter :* They are the *Spaniſh-Jaſmin*, the *Portugal-Jaſmin*, the *Indian-Jaſmin*, the *Arabian-Jaſmin*, one ſort with ſingle white Flowers, the other with double

Bloſſoms; and the *Coffee-Tree*, which is another kind of *Jaſmin*, bloſſoming at Autumn: Beſides theſe, there are many other Kinds in the *Amſterdam Gardens* which would be too tedious to mention.

The *Spaniſh-Jaſmin* is the moſt common of theſe; it bears white Flowers tinged with Purple on the Back of the *Petals*, or *Flower-Leaves*, and is very well ſcented: The Time of its Bloſſom is from *Auguſt* to *November*, and ſometimes all the *Winter* if it be kept warm and have Sun enough; this is propagated by Grafting it on the *Common White Jaſmin* in *March*, as alſo by Inarching it in *May* upon the ſame common Sort, and the inarch'd *Plants* may be cut off the middle of *Auguſt* following. In *February* we ſhould always cut off the Branches within four or five Inches of the Stem; and after they have freſh Earth put to their Roots, they may be ſet near the Glaſſes or Windows of the Houſe; theſe love not too much Water, and a *medium* Soil between Sand and Clay, without Dung; they are to be houſed with the *Orange-Tree*.

The *Portugal-Jaſmin* likewiſe bears a white Flower tinged with Purple, but the Bloſſoms are not ſo large as thoſe of the former, tho' in much greater Number: Sometimes I have ſeen near one hundred in a Cluſter; they ſmell like *Orange-Flowers*, and laſt a long time; the Leaves of the Plant are Ever-green (as are thoſe of the former) ſomewhat reſembling thoſe of the *Ivy*, it is propagated like the fore-going *Jaſmin*, and likewiſe by Cuttings planted in *May*, taking notice that they be of young Wood, and that at leaſt one Joint be ſet in the Earth, for at that part they take Root, tho' not 'till the ſecond Spring after Planting. I find that the *Plants* raiſed from *Cuttings* are apt to ſhoot very vigorouſly, and are therefore barren; but thoſe which are *grafted* or *inarched* upon common Stocks bloſſom every Year very ſtrong, which may proceed from the difference of Veſſels in the Stocks, and the Graft which checks its over Vigour.

This *Plant* begins its Bloſſom in *Auguſt*, and continues flowering 'till *October*; we may cut off the *inarched Plants* in the middle of *Auguſt*, which is the time of releaſing all other Plants grafted in the ſame manner, ſetting them immediately under ſome Shelter, leaſt they be damag'd by the Winds, which often break the *Cion* from the Stock. For this End of *Inarching*, we ſhould be careful to make Proviſion of ſome Plants of the *Commom Jaſmin* in Pots the Year before we deſign to graft, otherwiſe they will not be vigorous enough to incorporate with the *Cions*.

This *Jaſmin* ſhould be ſet in and out of the Houſe with the *Orange-Tree*, putting freſh Earth to the Roots in the Spring and

Autumn, as we muſt do to every other *Exotick Plant:* But as *Orange-Trees* love Shade in the *Summer*, this cannot have too much *Sun.*

The *Indian-Jaſmin* has Leaves ſomewhat like the former; it bears Bunches of yellow Flowers of a very agreeable Scent; it begins to flower about *Auguſt*, and continues its Bloſſom 'till the Spring following. I have frequently gather'd ripe *Seeds* of it, and have raiſed *Plants* from them, ſowing them as ſoon as they were ripe, and giving them the Aſſiſtance of a *Hot-Bed:* But the moſt common way of raiſing this *Plant* is from *Layers* in Autumn, or in the Spring, when we can get young Shoots to lay down, which ſhould always be as tender as poſſible for this Work, or they will not ſtrike Root, which muſt be obſerv'd as a Rule in the laying of every kind of Plant. The *Layers* of this *Jaſmin* will not be ſufficiently rooted 'till they have been a full Year in the Ground, and then may be taken off and planted in ſingle Pots. The beſt Seaſons of tranſplanting this Kind, is either in *April* or middle of *Auguſt*, the Earth for *Orange-Trees* does very well for this *Plant*, and it muſt be houſed as the other Kinds of *Jaſmin.*

It would be well to try whether this Sort would not encreaſe by Inarching it upon the *Common Jaſmin*; I ſee no reaſon why it ſhould not as well as the *Portugal* Kind; but if that will not do, the *Common Yellow Jaſmin*, I think, can hardly fail.

We have two Kinds of the *Arabian-Jaſmin*; one with ſingle Flowers, and the other with double Bloſſoms; in other reſpects they are alike, and require the ſame kind of *Culture*; the Flowers of both are white and extreamly ſweet-ſcented, but are ſomewhat differing from the other kinds of *Jaſmin* in their Figure: Both theſe Sorts bloſſom about *Auguſt*, and with good Management bring a great many Flowers; the Leaves are round, ſomewhat curl'd, and ſet on in Pairs at the Joints: I have raiſed them from Cuttings taken off in *April*, when theſe Plants ſhould be always pruned within two or three Joints of the Stem, and then have freſh Earth put to their Roots; by means of this Pruning they will ſhoot near a Foot in a Summer, as I have ſeen at the *Leyden Gardens*, where they have near one hundred of them in good Health.

This has been eſteem'd a very tender *Plant*; but I find it is more injured by Wet than Cold; it will ſtand the *Winter* very well in ſuch a *Green-Houſe* as I have deſcribed, if it has not too much Water, and may be ſet abroad the latter end of *May*, or beginning of *June*, and remain out of Doors 'till about the 20th of *Auguſt*: The Earth it chiefly delights in is at leaſt two

Parts in three of Sand, and the reſt freſh Mold from under a Turf: We may try to inarch it upon the *Spaniſh Jaſmin*, or increaſe it by *Layers* at the Pruning Seaſon.

The *Coffee-Tree* is another Kind of *Jaſmin* brought from *Arabia Felix*, about the Latitude of twenty or twenty one; the Leaves are like thoſe of our *Cheſtnut-Tree*, but are ever-green, and the Flowers like thoſe of our *Common Jaſmin* in Figure and Colour, but are not ſo ſweet-ſcented; they grow in Cluſters at the Joints, near the Extremities of the young Branches. About *July* this *Plant* begins to bloſſom, and continues flowering 'till *October*, ſetting plentifully with Fruit, which remains upon the Tree 'till the *July* following before they ripen, and are then of a dark red Colour, and in their Shape and Size ſomewhat reſembling the *Berries* of the *Lauro Ceraſus*, but have two *Kernels* in each of them, which ſplit in the middle like the *Bay-Berries* of the Shops.

In the *Amſterdam Garden*, which is ſo famous for curious *Plants*, I have ſeen ſome of theſe Trees near eighteen Foot high, ſo full of *Berries*, that ſeveral Pound Weight of Fruit was gather'd off of two Trees only. The *Hollanders* firſt got *Plants* from *Arabia*, which they afterwards planted about *Batavia*, and having increas'd them there, they ſupply'd the *Garden* at *Amſterdam* with them, and have now raiſed ſo many from Seeds that ripen'd in *Holland*, that they have ſent over ſeveral Trees to their Settlement at *Surinam* in the *Weſt-Indies*, in order to cultivate them in that Country, where they will undoubtedly turn to good Account, as I am perſwaded they would do if they were propagated in the *South* Parts of *Carolina*, which I think would be well worth our Trial, if that Country remains in our Hands.

In the *Culture* of this *Plant* the *Dutch Gardeners* prepare a Soil for it compos'd chiefly of Sand, and the Refreſhings they give it with Water are ſeldom and ſparing in the *Winter*; but in the *Summer* it has a more plentiful Allowance, eſpecially during the time of its Bloſſom. About *June* they take it out of the Houſe and waſh and clean the *Leaves* and *Branches*, and letting it remain in the Air 'till the beginning of *July*, they then ſet it in again to the *Conſervatory* for flowering. In *April* and *Auguſt* they give freſh Earth to the *Plants*, and they thrive extreamly.

In the raiſing of theſe *Plants* from *Seeds*, they firſt ſeparate the *Kernels* in each *Seed*; and after they are cleanſed from the Muſcilage about them, they are immediately ſet two Inches deep in Pots fill'd with ſandy Soil, and plunged into *Hot-Beds*: The *Seeds* being

ing thus order'd, muſt be kept moiſt by frequent Sprinklings of Water 'till they come up, and the Glaſſes over them always kept cloſe; about ſix Weeks after Sowing they will begin to appear, and have two or three Leaves a-piece before *Winter.* I have heard, that unleſs the *Seeds* are ſown as ſoon as they are gather'd they will not come up; and hitherto there is no other way known of propagating this *Plant* but from *Seeds*, tho' I think it would not be againſt Reaſon to try to Inarch it upon ſome other Kind of *Jaſmin.*

The *Geranium* is a *Plant* whoſe Varieties are very conſiderable, if we were to join thoſe of our own Country with the Kinds we receive from *Africa*; it takes its Name of *Cranes-Bill* from its Seeds, which ſomewhat ſemble the *Beak* of a *Crane* or *Stork:* Hitherto the *Exotick Kinds* have carry'd *Latin* Names only, which I think help to confound ſome *Gardeners*, and indeed are too long to recite; I ſhall therefore, ſince I have this Opportunity, give each Sort, which we cultivate at preſent in our *Green-Houſes*, a ſhort *Engliſh* Name for the greater Eaſe of the Memory.

Many of the Sorts I deſign to treat of have been figur'd by the Learned and Accurate Dr. *Commelin*, *Botanick* Profeſſor at *Amſterdam*, and that late Admirable *Botaniſt* Dr. *Herman* of *Leyden*, to whoſe Works I refer for the Cuts of thoſe I am about to mention.

In the *Hortas Lugduno Batavus*, Page 275, we find the *Geranium Africanum Arboreſcens, Ibiſci folio rotundo, carlinæ odore*, which we may *Engliſh* the Round Mallow-leav'd Cranes-Bill.

Page 278 of the ſame *Geranium Africanum Fruteſcens, malvæ folio Laciniato odorato*, or Notch'd Mallow-leav'd Cranes-Bill.

Page 283, *Geranium Africanum, Alchimillæ Hirſuto Folio, Floribus Albidis*, or Alchimilla-leav'd Cranes-Bill.

Page 285, *Geranium Africanum, Noctu Olens, Tuberoſum & Nodoſum, Aquilegiæ foliis*, or Colombine-leav'd Cranes-Bill.

In Dr. *Commelin*'s *Prælud. Botonic.* Page 51, *Geranium Africanum Arboreſcens, Archimillæ hirſuto folio, floribus rubicundis*, which we may call the Painted-leav'd Cranes-Bill, as I ſhall further explain.

Page 52, *Geranium Africanum, foliis inferioribus Aſari, ſuperioribus Staphydis Agriæ, Maculatis, Splendentibus, & acetoſæ Sapore*, which we may name Spotted Ivy-leav'd Cranes-Bill.

Page 54, *Geranium Africanum fruteſcens folio Craſſo, & Glauco, acetoſæ Sapore*, or Sea-green Cranes-Bill.

Beſide theſe, we have in our *Gardens* two Dwarf Kinds of *Cranes-Bill*, with tuberous Roots, whoſe Flowers ſmell ſweet in the Night: I have not ſeen any Cuts of them, and therefore ſhall not give the Authors Names; the one I ſhall call the *Anemone-leav'd Night-ſcented Cranes-Bill*, and the other the *Fenil-leav'd Night-ſcented Cranes-Bill.*

The firſt of this Liſt makes a Shrub of three Foot high; the Leaves ſmell ſomewhat like *Rhubarb*, and it bears large Bunches of Purple Flowers variegated with a darker Colour; this bloſſoms from *July* to *September.*

The Second, with the notch'd Leaves, is a Shrub about the height of the former, with ſweet-ſcented Leaves; the Flowers are ſmall, and of a very pale purple Colour, and appear about *May* and *June.*

The Third has Leaves like the *Plant* call'd *Ladys Mantle*, is a low Plant in compariſon with the others, and bears white Flowers about *June.*

The Fourth has large Knots at the Joints, and Leaves like the *Columbine*; the Flowers which commonly appear in the *Summer* are extreamly ſweet in the Evenings, but have no Scent in the Day-time.

The Fifth, which I call the *Painted-leav'd Cranes-Bill*, makes a Shrub ſometimes four Foot high, and bloſſoms very plentifully all the *Summer*, bearing large Cluſters of Pink-colour'd Flowers; each of its Leaves are curiouſly mark'd with a dark-colour'd Streak in the ſhape of a Horſe-Shoe; which together with the pleaſant Green of the Leaf is very beautiful: And what is likewiſe worthy our Notice, when theſe Leaves decay the green Parts change into a fair Yellow; and the dark Streaks, which are naturally almoſt Black, alter into a bright *Vermillion*; ſo that I cannot help ſometimes, for the ſake of ſo agreeable a Variety, bruiſing ſome of them to forward their Decay. The Alteration of Colours in the Leaves of this *Plant* gave occaſion to a Learned *Member* of the *Royal Society*, Dr. *Stuart*, to conſider the Cauſe of different Colours in the Leaves and Flowers of Plants, which he has ſo judiciouſly ſet forth in a Letter he was pleas'd to honour me with upon that Subject, that for the Embelliſhment of my Work, I ſhall inſert it in the Concluſion of this Chapter.

The Sixth Kind mention'd in the Liſt has ſhining Leaves like thoſe of *Ivy*, and pretty Flowers, of a pale purple Colour, variegated with a deep Red: the *Plant* inclines to run upon the Ground, and therefore to give it the better Appearance, we are forced to ſupport it with Stakes; it bloſſoms in the Autumn.

The Seventh has thick juicy Leaves of a Sea-green Colour, taſting ſomewhat like *Sorrel*; the Branches are naturally ſo weak that they muſt be ſupported with Sticks. About *July* this *Plant* begins to flower, and remains bloſſoming 'till about *September*; the Flowers of this Kind are of a pale Fleſh Colour, and variegated with Crimſon.

All theſe Kinds are propagated either by *Seeds* or *Cuttings*; the *Seeds* may be ſown in *March* upon a *Hot-Bed*; but the moſt proper Seaſon of planting the *Cuttings* is about the End of *May*, and then they will eaſily ſtrike Root in the natural Ground, and become handſome *Plants*, fit to be potted the *Auguſt* following; they love a medium Soil without Dung, and delight in Water; they may be houſed with the *Orange-Trees*, for they are not very tender.

The other Kinds of *Geranium*, ſur-nam'd *Night-ſcented* Bloſſom, at uncertain times in the *Summer*, and are propagated by parting their Roots in *May*. The Leaves of the *Fennel*-leav'd Kind, have a very grateful Scent; both theſe are hardy, and may be houſed with the others; they love a light Soil.

I ſhall now conclude this Chapter, with the Ingenious Letter which I promis'd relating to the Colours in the Leaves and Flowers of *Plants*.

To Mr. BRADLEY.

London May the 9*th*, 1717.

S I R,

YOUR ingenious Converſation, join'd with the Delights of Mr. *Balle*'s curious *Gardens* at *Cambden-Houſe*, made ſuch an Impreſſion t'other Day, as led me into the following Thoughts on the Subject You then ſtarted, concerning the Variation of Colours in the *Leaves* and *Flowers* of *Trees* and *Plants*, ſuch as is remarkable in the variegated *Hollies* and *Tulips*; of which Variegation you have certainly aſſign'd the true remote Cauſe, in the ſecond Part of your *New Improvements of Planting and Gardening*, Cap. VII. Sect. 1. of the *Tulip*, where you aſſert, that a Weakneſs and Defect of Nouriſhment produce that Variety of Colours, which was not naturally and originally in the *Plant*, which you ſupport by Obſervations, Experiments and Hiſtories there, and in ſeveral other Parts of your Works, ſo as to put it beyond all doubt.

On this Occaſion you ſhow'd me a bruiſed and faded Leaf of the *Geranium Africanum Arboreſcens Alchimillæ hirſuto folio, floribus rubicundis*, Comel. Prol. Bot. partly Green, but turn'd of a pretty deep Red in the bruiſed Parts; this gave Riſe to our Diſcourſe concerning the immediate Cauſe of the natural Colour in Plants, and of this preternatural Colour in the bruiſed Parts.—— I'm perſwaded I ſhall not be able to give one of your Taſte any Satisfaction on this Subject; I only venture to ſend you ſome looſe Thoughts concerning it, being aſſur'd that your various Obſervations and Experience will ſoon expunge the Errors of one leſs converſant about theſe things.

I imagine then that the natural, as well as preternatural Colours in *Plants* and *Flowers*, are owing immediately to the Juices circulating or contained in their Veſſels, and not to the Veſſels themſelves, which I think appears by the expreſs'd Juice retaining the Colour of the *Leaf* or *Flower* from which it's drawn, while the groſs fibrous Part, which is the Veſſels retain'd in the Strainer, loſe their Colour with their Juice, and being examin'd by the naked *Eye*, or a *Microſcope*, appear colourleſs or tranſparent, ſo far as they are drained of their Contents: Theſe then being tranſparent, reflect few Rays to our Eyes, but tranſmit moſt of them, which the more opaque Maſs of Fluids rereflects, giving us ſuch colour'd Rays of Light, as it cannot abſorb or tranſmit. 'Tis from the Juices then we have the ſeveral Colours of *Plants* and their *Flowers*; but what ſpecial Texture of the Fluids, and their Surfaces, or of any other Object, may be neceſſary to reflect this or that Kind of coloured Rays, for ought I know, is not determined with any abſolute Certainty.

But as moſt of our Knowledge of Nature conſiſts in our being able to aſſign ſome remoter Cauſes, and a few Effect of things, in ſome groſs Manner, rather than in an intimate Acquaintance with their Eſſences; So after the ſame manner we may be able to go ſome Length in this Diſquiſition, towards finding out the remoter Cauſe of Colour in the Juice of *Plants*, tho' we cannot point out the minute Figures in the Particles of that Fluid, which may immediately produce this Effect.

Thus then the Bloſſoms and Fruit produced according to the Nature of the ingrafted Branch, and not of the Stock of a different Kind, do ſhew that the circulating Juice of *Vegetables* is alterable by the Mould of the Veſſels through which it paſſes, ſo as to be forced by them to put on a different Colour and Taſte from what it had before it entred them; and we find this equally true in Animals.

There's only ſome, and thoſe very few, Exceptions of Juices in Plants, and common Salt in Animals, which ſeem to be inconquerable by the Power of their Veſſels, ſo as to be able to paſs through them, and circulate for ſome time, without any ſenſible Alteration. The Chymical *Analaſis* of the

Blood, Urine, *&c.* of ſuch Animals as uſe common Salt in their Food, having diſcovered it unaltered in any of its Qualities, after many Circulations in the Animal Body: And by your own Experiment, mention'd *Cap.* I. *Part* I. of your *New Improvements of Planting and Gardening*, and Mr. *Furber*'s, *Cap.* II. *Sect.* 1. of the ſame Works; by theſe Experiments I ſay it appears, that ſome Juices are ſo far from being liable to ſuffer any Alteration by the Veſſels of the *Plant* in which they circulate, that they rather ſeem to have the Power of altering the natural Frame and Texture of the Veſſels themſelves, and of making a very laſting preternatural Impreſſion upon them, by which they become capable afterward of moulding and framing their Juice to a different Colour from what it had naturally, and before the Experiment; elſe it would be very difficult to conceive how ſuch a ſmall Quantity of Juice, communicated from a ſingle Bud of yellow ſtrip'd *Jaſmin*, inoculated upon a Branch of a plain *Jaſmin-Tree*, ſhould in three Months time (ſuppoſing it ſelf to periſh as the Experiment allows immediately after that time) be able to occaſion ſuch an Alteration of the natural Juice of the whole Tree, to the Colour of the Bud inoculated, continually through all the ſucceeding Years of that Tree's Duration; for ſuch a durable Effect muſt have a permanent

Cauſe, but that cannot be found in the fluctuating Juice, which is daily waſted and renewed, but muſt be owing to ſome Alteration in the Figure or Diameters of the Veſſels, which may be ſuppos'd to continue the ſame for many Years after, unleſs ſome new Alteration be induſtriouſly, or by ſome uncommon Accident wrought upon them: The Concluſion to be drawn from Mr. *Furber*'s Experiment will be much the ſame.

But Inſtances of this kind being very rare, we are only to regard the common Courſe of Nature, which has made theſe circulating Juices generally alterable by the Power of the *Solids* or containing *Veſſels*, both in *Plants* and *Animals*. Thus the Juices do ſeem to get and retain their ſeveral natural Colours from the *Solids*, ſo long as they continue in a due Courſe of Circulation through them.—— But when the Circulation, for whatſoever Cauſe, begins to fail or become languid, there ſeems to be yet another poſſible Cauſe of Colour in *Plants*, to wit, of thoſe preternatural Colours or Variegations, ſubſequent to a Defect of Nouriſhment, or a Wound or Bruiſe in any of their Parts: In all which Caſes, the Circulation and concurring Energy of the Veſſels are languid, and therefore a Degree of Stagnation enſues: And as every Stagnation of a vegetable Juice is attended with a proportionable Degree of Fermentation, and Fermentation is productive of conſiderable Alterations, both in the Taſte and Colour of the fermenting Juice, it may not be altogether improbable, that, in the Caſes mentioned, the Variation of Colour may proceed from certain Degrees of Fermentation in the Juice; tho' I only advance this as a probable Conjecture, and not what I can from any Experiment demonſtrate.

However, to render this Conjecture ſomewhat probable, we are to conſider, that the conſtant natural Tendency of all recent vegetable Juices is to Fermentation; which commences ſo ſoon as they are leſt to themſelves, or delivered from a progreſſive local Motion of the whole Maſs: This appears in the expreſſed Juice of the *Grape*, and of all *Fruits*, and in *Malt Liquors*, which from the Beginning are in a few Days carried to the height of Fermentation, in which time they acquire, firſt a ſweetiſh, and afterwards a vinous Taſte; and by a ſecond Fermentation (which in the weakeſt of them happens very ſoon after the firſt) become Vinegar or ſour; their Colour at the ſame time becoming leſs ſaturated, more tranſparent, leſs opaque. But this is yet more remakable in the Juice of high-coloured Flowers, as of the *Clove July-Flowers*, *Corn-Poppy* and *Violet*; all which Juices are apt to ferment in ſome little time after Expreſſion, and in the Fermentation ſenſibly loſe a good deal of their Colour, become paler, and more tranſparent: Indeed the *Violet* Juice loſes almoſt entirely its Colour in Fermentation. The ſame Fermentation happens to the Juice of *Vegetables* yet contain'd in their *Veſſels*, and enjoying ſome low Degree of irregular Circulation, as appears by *Herbs*, *Graſs*, *Hay*, *Flowers*, *Fruit*, *&c.* cut down and thrown together in a Heap, where all the Signs of Fermentation do very ſoon appear; ſuch as *Heat*, *Sweating*, change of *Smell*, *Taſte* and *Colour*; ſo that it ſeems plain, that Fermentation in all its Effects, takes place in the vegetable Juices, ſo ſoon and as far as the Circulation declines: Theſe two different Powers, or Operations of Nature, being ſo contrary to one another, that they cannot ſubſiſt together in Perfection; but like the oppoſite Weight in the Scales of a Ballance, as the one proponderates, the other muſt give way. And indeed the Caſe in Animals is very near parallel to this, if we ſubſtitute Putrefaction in them to Fermentation in *Vegetables*; for in thoſe we find, that the Blood in a bruiſed Part degenerates from its natural Colour by Stagnation, into a Livid, Blue, Green and Yellow (all Signs of Putrefaction) ſucceſſively, until the Re-abſorption be perfected, and the Circulation reſtored.——This is farther illuſtrated by the common Practice of ripening green Fruit in Straw, or in a moderate Warmth, where Evaporation of the Juice and Defication may be avoided; which ſhows that the change of Taſte and Colour, can be owing to nothing elſe here than a certain ſlow degree of Fermentation, entertain'd by that Artifice in the Juice contained within the Veſſel or Veſicles of the Fruit; Was there indeed a free and open Communication with the external Air, this Fermentation would go on to produce the ſame Effects more quicker, as we ſee in the ſame Juice expreſſed: And as all Experiments in Fermentation do ſhew, that either a total Stagnation, or ſome degree of it, and Heat, are neceſſary to produce Fermentation in vegetable Juices, the Autumn affording us a ſlow Circulation of the Juices, and an increaſed Heat; theſe two concurring muſt needs produce that degree of Fermentation, to which we owe the ripeneſs of our growing Fruits, and the change of their Colours and Taſte in that declining Seaſon; as we owe the ripeneſs of our Liquors more remarkably to the very ſame Cauſes: And was it poſſible there ſhould be a perpetual Spring, that is, a continued equal brisk Circulation of the Juices, with ſuch a low degree of Heat as that Seaſon affords, it would be equally impoſſible to produce ripe Fruit, becauſe the two Pre-requiſites of Fermentation wou'd be wanting in Nature, tho' Art might in ſome meaſure ſupply that Defect.

The Concluſion then ſeems to be this, That Circulation and Fermentation are the two only Powers in Nature which can produce the Variety of Colours, and the other Changes we obſerve in Vegetables; as Circulation and Putrefaction are the two Powers that work the various Changes in Animals: And that as the due degree of Circulation in either declines, or is impair'd, Fermentation or Putrefaction takes place reſpectively, exhibiting the Signs of Diſeaſes or Decay, of which themſelves are the immediate Cauſes.

If I rightly remember, ſomething was mentioned in our Converſation concerning the different Strength of the coloured Rays of the *Sun*, and whether the Reflection of theſe ſtronger or weaker Rays might not depend upon a ſuitable Strength and Weakneſs in the Texture of the *Plant* or *Flower*; as if the ſtrongeſt Rays, which are the Red, being reflected by a red *Flower*, might not argue a greater Strength in the Texture of that Flower, or its Juices, than is in the Blue *Flowers*, which Reflect only the Blue, to wit the weaker Rays of the *Sun*.

If we may judge of the Strength of the Rays of the *Sun*, by their different degrees of Refraction in paſſing through a *Priſm*; as their Refraction increaſeth, ſo their Strength de-

decreaſe in this Order; *Red*, *Orange*, *Yellow*, *Green*, *Blue*, *Purple* and *Violet*; ſo that the *Red* is the ſtrongeſt, ſuffering leaſt Refraction, and *Violet* the weakeſt as it ſuffers the greateſt Refraction. But when we conſider theſe Rays, as reflected from opaque Bodies, we find that Objects of the weakeſt Texture reflect the ſame kind of Rays with thoſe of the ſtrongeſt Make, as *Red* is ſhewn by the tender *Tulip*, as well as by the more durable *Roſe*; and ſo in a Variety of other Objects, differing yet more in Strength or Weakneſs: So that the Strength of Bodies reflecting Light, ſeems not to be ſo much concern'd in the Reflexion as the Frame and Diſpoſition of their Surfaces, which may be the ſame in the weakeſt, as in an Object of the ſtrongeſt Compoſition. Beſides, the Strength of the Texture of *Plants* and their *Flowers*, ſeems to depend more upon the Firmneſs and Diſpoſition of their Veſſels, than upon the Conſiſtence of their Juices; but the Veſſels, being tranſparent, are leaſt concern'd in the Reflexion of Colours; therefore the reflected Colour ſeems not to depend upon any Propoſition of Strength or Weakneſs in the *Plant* or *Flower*.

Thus, Sir, I have ventur'd to ſhew you how ſuperficial and conjectural my Knowledge on this Subject is, in hopes that you'll forgive and correct the Faults which my Compliance with your Deſire has led me to diſcover, being with ſincere Reſpect and Eſteem,

SIR,

Your moſt Humble

And Obedient Servant,

Alexander Stuart.

CHAP. IV.

Of the MELIANTHUS, OLEANDER, MALABAR-NUT, LEONURUS, AMOMUM PLINII, CAPER, ACACIA, APOCINUM, *and other* Exotick Shrubs, *which are not ſucculent, their* Culture.

OF the *Melianthus* we have two Kinds, the Greater and the Leſſer; they are both *African Plants*, and bloſſom freely with us, eſpecially if they are not uſed too tenderly. The large Kind will ſtand abroad during the Winter, and ſeldom fails to produce its Spikes of Flowers every Year, which are of a *Coffee* Colour; Theſe Flowers afford each of them a drop or two of a clammy Juice, taſting as ſweet as Honey, from whence I ſuppoſe it took its Name of *Melianthus* or *Honey-Flower*. The ſmalleſt Sort is not ſo common with us as the other, and is therefore kept in the Houſe all *Winter*; tho' I am of opinion it would ſtand abroad as well as the large Kind, which comes from the ſame Country. The Flowers of this ſmall Sort are very beautiful, having a Mixture of Red, Green and Yellow in them; both theſe *Plants* are propagated with eaſe from Slips taken from about the Roots any time between *May* and *Auguſt*; they delight in ſandy Soil and much Water, eſpecially the large Kind; both theſe are deſign'd with great Accuracy; the Firſt in the *Hortus Lugd. Bat.* and the ſmall Sort in Dr. *Commelins*'s *Plant. Rarior. Amſtelod.*

The *Oleander*, or *Nerium*, which ſome call the *Indian Laurel*, has many Varieties. The moſt common of them in the *Engliſh Gardens* is the Sort with the red Flower, which is call'd the *Scarlet Oleander*, it is ſo hardy, that I have kept it abroad all *Winter* without any other Shelter than a *South* Wall; it is eaſily propagated by *Layers* in *April*, which will ſtrike Root to tranſplant the *Auguſt* following. We have likewiſe a white flowering Kind, as hardy as the ſcarlet Sort; but the other Varieties of this *Plant*, ſuch as the *Sweet-ſcented Oleanders*, with

Single and *Double Flowers*, are eſteem'd more tender, and ſhould be houſed with the *Orange-Trees*; all theſe bloſſom in *July* and *Auguſt*, and are propagated like the Firſt; they love a medium Soil, without Mixture, and moderate Watering: See the Figures of the two laſt in the *Hortus Lugd. Bat.*

The *Adhatoda Zeylanenſium*, call'd by our *Gardeners* the *Malabar-Nut*, is very apt to bloſſom with us, but has not yet, as far as I can learn, produced any ripe Fruit in *England*; it makes a large *Plant*, and is pretty hardy, and is an extravagant Lover of Water: The Earth ſhould be the ſame as for the *Oleander*, and the Pots large; for theſe Trees encreaſe prodigiouſly in their Roots, which ſhould be prun'd every *Auguſt*, and freſh Earth put to them: This is increas'd from Cuttings planted in *May*, which ſtrike Root very eaſily in the natural Ground; it muſt be houſed with the *Orange-Tree*. There is a good Cut of this *Plant* in the *Hortus Lugd. Bat.*

The *Leonurus* is a *Plant* of the *Cape* of *Good-Hope*, named by *Breinius*; it is of the Species of the *Sideritis* or *Iron-Wort*, in which Tribe Mr. *Ray* has placed it: We have two Sorts, one with Leaves like *Hemp*, and the other with round notch'd Leaves like thoſe of the *Lamium*, or *Dead-Nettle*; the Flowers of both Kinds are alike, of an *Orange*

Orange Colour, and of the ſame Size and Figure, bloſſoming in *September* and *October*; they are both eaſily propagated by Cuttings planted in any of the *Summer* Months upon a common Border, where they ſoon ſtrike Root if they have Water enough; the Earth for the foregoing *Plants* is very fit for this, and in every reſpect ſhould be treated like the *Malabar-Nut.*

The *Amomum Plinii*, or *Tree Night-Shade*, is a pretty Shrub, eaſily propagated either from *Seeds* or *Cuttings*, which we may put into the natural Ground in *May*; the *Berries* are ſomewhat like *Cherries*, and ripen ſoon after the *Plant* is brought into the Houſe, and remain upon the *Plant* all *Winter*; it is call'd by ſome therefore, the *Winter-Cherry*, which is the moſt common Name: Its *Culture* is the ſame with the foregoing *Plant*; only to make it bear Fruit plentifully, it may be brought out of the Houſe with the *Myrtle*; and during the *Summer* it muſt ſtand in ſome place defended from the *Sun*, and conſtantly ſupply'd with Water; but it will not bear any Fruit if it be ſet under Trees: It is ſo hardy, that I believe it would ſtand abroad all the Year, but I have not try'd it.

In the ſame Tribe is the *Mala Inſana*, or *Mad Apples*, or the *Solanum Pomiferum*, which is extreamly well figur'd in the *Hort. Ludg. Bat.* It has Leaves deeply notch'd and arm'd with *Spines*; the Flowers are of a deep Purple, and the Fruit before they ripen variegated with White and Green; and being fully mature, are as large as ordinary *Golden-Pippins*, and of a bright yellow Colour; theſe Fruits ripen in the *Winter*, and contain many ſmall Seeds, like thoſe of the *Capſicum Indicum*, or what we call *Guiney-Pepper*; they may be ſown in *March* or *April* upon Hot-Beds, and will bear Fruit the ſecond Year: Give this *Plant* the ſame Earth as the *Orange-Tree*, and houſe it at the ſame Seaſon: This, like all other potted *Plants*, muſt have freſh Earth every Spring and Autumn. Beſides this, we have another Kind, whoſe Leaves are ſhaped like thoſe of the *Oak*, but are ſo hoary that they ſeem to be made of white Woollen-Cloth; this Sort bears ſmaller Fruit than the other of a Golden Colour, which alſo ripen in the *Winter*; it requires the ſame Management as the former Kinds.

The *Caper* has been propagated with great Care in our *Green-Houſes* to very little purpoſe: Where the greateſt Induſtry has been uſed, it has hardly been brought to flower in *England*; and tho' it has had the Advantage of the beſt Stoves, it has been ſubject to die in the *Winter;* which has given Occaſion to ſome *Gardeners* to believe it was too tender for this Climate; but that Notion is unſeaſonable, ſince we know the *Caper*

per is an *European Plant*, growing familiarly about *Genoua* and the *South* Parts of *France*; the Soil and Situation is only to be conſulted to make it thrive very well in *England*, even in the open Air. It will reſiſt the Severities of our *Winters*, as I have experienced, being ſown in the Cracks of old Walls, where it ſtrikes Roots in the Morter: Where it grows wild, it grows in like manner on the ſides of rockey Places among Rubbiſh, and in Holes of old Stone-Walls or Ruins: If even it is planted in a Pot of Rubbiſh, it will not thrive, if it is directed to grow upright, but muſt rather be ſo diſpoſed, as either its Root may be ſomewhat above the Branches, or at leaſt it may grow parallel with the Earth, ſuch as it will do if it it be ſet in the Side of a Wall. The Bloſſoms are very beautiful, of a *Peach-Bloom* Colour, crouded with *Tendrils* or *Staminas*: The Buds of theſe Bloſſoms are picklid for Eating. It may be as well propagated in *England* as in any other Part of *Europe*, by obſerving the Method I deſcribe, and ſowing the *Seeds* in *March*, which readily come up, if we cover them with ſifted Rubbiſh after we have laid them in the proper Places. It has been a great Fault that ſome have been guilty of, when they have receiv'd *Plants* and *Seeds* from foreign Countries, to give them too much Warmth, without conſidering whether they came from the *North* or the *South*; from *Muſcovy* or *Greenland*, or under the *Line.* I am of opinion it would be as hard to keep an *Iceland* Plant with us, as one that grew immediately under the *Line*; for as the one is naturally maintain'd by exceſſive Cold, ſo is the other by extream Heat. I imagine that the greateſt Cold of our *Winters* is near the ſame with the Temper of Air in the *Summers* of thoſe Countries, lying in ſeventy or ſeventy five Degrees of Latitude; and if ſo, then the *Plants* from thoſe frozen Parts of the World could only be made to grow with us in our colder Seaſons, when perhaps they would not be naturally inclin'd to ſhoot, for then the Sun would be far diſtant from their native Country, which would be the time of their *Winter*; and if we could make them ſhoot at that time by our natural Temper of Air, the Heat of our *Summers* would afterward ſcorch them to death, or ſmother 'em, unleſs they were to be kept in *Ice-Houſes* during the Seaſon of our warm Weather, and not expos'd abroad 'till our Froſts began: For if we are to follow Nature in the *Culture* of *Plants* from hot Countries, we muſt do the ſame in the Management of thoſe from the frozen *Zone*, we muſt imitate the Heat of one, and the Cold of the other.

Let us not therefore miſtake, in ſuppoſing that the ſame Degree of the Sun's Heat, and the ſame Temperature of Air, which is natural to any one Part of the World; is neceſſary for the ſetting in Motion the *Sap* of the ſeveral *Plants* natural to divers Countries: As every Climate is different from the reſt, ſo are the ſeveral Plants in thoſe Climates naturally adapted to grow; by means of the wonted Temper of Air and Warmth of their native Countries, and will not thrive near ſo well in Stations, only a little differing from the Placc of their Birth: And indeed it is partly the ſame in living Creatures, which we find do not all require the ſame Degrees of Warmth for hatching them from their Eggs: The ſame Heat which hatches the Egg of a *Pullet* would deſtroy the Eggs of *Inſects:* And I ſuppoſe that the Warmth which hatches a *Pullet*, would not be half enough to hatch the Egg of an *Oſtritch*, who is forced to lay her Eggs in the ſcorching Sands of *Africa* to bring them to Life.

It is obſervable, that *Moſſes* of ſeveral Kinds only grow with us in the *Winter*; and at the leaſt approach of warm Weather they decay, and are entirely at a ſtand, and ſeemingly dead when our *Summers* begin, which may ſhew us that there are Plants that grow in certain degrees of Cold (as we call it) as well as Heat; for *Moſſes* are no leſs perfect Plants than *Oaks*, or other the moſt remarkable Trees; they have *Roots*, *Branches*, *Leaves*, *Flowers* and *Fruit*, as well as the moſt notable *Plant*. I have heard that the colder Climes abound with *Moſſes*, which are ſtill larger and in greater Quantities, as we go more towards the *North*; and they that ſerve for Food for the *Rane Deer* in the *North* Parts of *Muſcovy*. I remember once to have ſeen a *Plant* brought from about *Norway*, which grew in ſixty five or ſixty ſix Degrees, that budded out in *December*, and continu'd growing 'till the following *March*; but after that I am not well aſſured what became of it: But 'tis time now that I return to the *Culture* of thoſe *Plants* I undertook to treat of in this *Chapter*. Beſides the *Caper* already mention'd, we have two other Kinds, that with the ſmall yellow Flower, and the *Bean Caper*, they are both raiſed from Seeds ſown in *March* in ſandy Soil; the firſt requires the *Green-Houſe* in the *Winter*, but the other will thrive very well in an open Border, as I've ſeen it do in the *Amſterdam Garden*, altho' it is commonly houſed with great Care in *England*.

I have ſeen many Sorts of *Acacia* clutivated in the *Amſterdam Gardens*; and I remember formerly three or four Sorts of them were growing among the Rarities at *Hampton-Court*; but at preſent we have few of them in *England*, unleſs it be the *Virginian Kind*, which grows to a large Tree, and will ſtand abroad without Shelter in the *Winter*; as we may ſee ſome of them now growing in the Court before *Ruſſel-Houſe*, *Bloomsbury*,

and

and in the Old Palace Yard, *Weſtminſter*; a plain Proof we might eaſily naturalize the *Virginian* Plants to our Climate. The Leaves of this, and other *Acacia*'s, are not unlike thoſe of the *Tare* or *Vetch*, and differ from one another chiefly by being larger or ſmaller, and not in their Shape: Some again are vary'd from the reſt by having large Spines or Thorns growing upon the Foot-Stalks of the Leaves, ſometimes as large as Cock-Spurs, and the Flowers of ſome of them are ſweet-ſcented; theſe, as they come from ſeveral Parts of the World, ſhould be conſider'd in relation to the Heat neceſſary for them; but they all, ſo far as I yet have obſerv'd, love a dry ſandy Soil, and little Water.

The *Apocinum*, or *Dogs-Bane*, has many Varieties; ſome growing upright like little Trees, and others climbing and creeping on the Ground like the *Woodbind:* The Flowers in their Shape are not much unlike thoſe of the *Amomum Plinii*, but have their Petals turn'd more back; their Colours are various: Theſe all bear Cods, for the moſt part ſhaped like thoſe of the long *Guiney Pepper*, but their outſides commonly cover'd with long tender Spines of the ſame Colour with themſelves; within them are the Seeds lying as it were in a Bed of Cotton, ſome of which adheres to each of them; from the Seeds we may propagate them with eaſe, by ſowing them in *March* on *Hot Beds*, or elſe raiſe every ſort I have yet try'd, from Cuttings in the ſame Month, unleſs they be ſuch as have tuberous Roots, which muſt then be parted; and ſome indeed which die to the Root every Winter, will be better increaſed from *Off-ſets* taken from the Roots: I give them commonly a light natural Soil, which I find agrees well with them, and little Water, for they are all very milky, and apt to rot with much Wet. As to their Shelter in the *Winter*, it may be given them according to the different Climates they come from, and be ſet into the Houſe ſooner or later, as they are more or leſs tender.

We have two Sorts of the *Canna Indica*, or *Indian Cane*; one with plain green *Leaves*, and the other with variegated *Leaves*; they both flower in the Autumn, producing Spikes of ſcarlet Bloſſoms extreamly beautiful: The firſt is raiſed from Seeds ſown in *March* upon a *Hot Bed*, and may be increas'd by parting the Roots in the ſame Month; and ſo the ſtrip'd ſort alſo is propagated by *Off-ſets*; for the *Seeds* of the ſtrip'd Kind, which often ripen in *England*, will produce Plants with plain Leaves: They delight in a ſandy Soil, and little Water, and muſt be houſed with the *Orange-Tree*.

Of the *Geniſta* we have ſeveral ſorts, which are cultivated in *Green-Houſes*; they all love a ſandy dry Soil, and are always propagated from *Seeds*, for *Cuttings* will not take Root, neither do I believe *Layers* will ſucceed any better; as moſt of them have few ſpongy or parenchimous Parts, they require little Water, and ſhould be houſed according to their Climates.

The *Palm* or *Date-Trees*, are only propagated by ſetting the *Date-Stones* in light Earth in *March*, and giving them the aſſiſtance of a *Hot-Bed*; they are indeed ſlow Growers, but indifferently hardy; they grow in *Italy* without any Shelter, and I believe might be brought to ſtand abroad in *England*, after giving them Shelter for the three or four firſt Years.

The *Jalop-Tree* of *Carolina*, call'd in *Virginia*, *Poke*, is a Plant that dies to the Root every *Winter*, and riſes again in the Spring to the Height of eight or ten Foot, having many Branches of a red Colour, the Leaves ſmooth and of a pleaſant Green; the Berries are like *Elder-Berries*, but grow in long Bunches ſomewhat like *Grapes*; theſe are uſed for dying Red; the young Tops are pleaſant and wholſome when they are well boiled, and are frequently eaten by the People of *Virginia*; but if we gather them too old they purge and vomit violently: The *Pidgeon* and other Birds are very greedy of the *Berries* of this *Plant*; a *Drachm* of the Root dry'd and powder'd (ſays my Correſpondent)

reſpondent) is a very ſafe and good Purge, very much like *Jalop*, and is frequently uſed by the *Indians*; this is rais'd from the Berries ſown early in the Spring on a *Hot-Bed*, and delights in a rich warm Soil; it ſhould be houſed with the *Orange*.

The *Pitchumon*, or *Perſimon-Plum*, call'd by the *Indians Puchimon*, is a *Plant* of *Virginia*, where it grows to the Size of a common-*Cherry-Tree*; the Wood is white, and the Leaves very green and ſhining on the upper Side; the Fruit ſomewhat like a *Medlar*, with ſeveral Seeds in it; when it is ripe is ſoft and luſhious: This *Plant* may be propagated by ſowing the *Seeds* in *March*, like the former. It loves a light Soil, and little Water, and may be houſed with the foregoing Plant.

The *Side-Saddle Flower*, is a *Plant* growing in *Virginia* and *Carolina*, which according to the Deſcription I have had of it, with its *Seeds* which I have receiv'd from ſeveral Hands this Spring, is one of the moſt ſurprizing Plants of thoſe Countries; it dies every Year to the Root, and riſes afreſh every Spring, putting forth at that time a yellow Flower upon a ſlender Foot-Stalk with ſix Leaves, ſhaped ſomewhat like thoſe of the *Flower-de-luce* upon the top of the Stile grows a ſort of Canopy, round on the Top like the Seat of a Side-Saddle, under which is the Seed-Veſſel, divided into ſix

Cells; the Plant follows the Flower, growing about a Foot high, and ſomewhat ſhaped like a *Trumpet*; upon the Top of which is a Leaf like the Lid of a *Can*, which is, at the firſt coming up very green, but afterwards becomes yellow, full of purple Veins; this grows in ſpongy Ground in watery Places, ſo that it muſt be ſown in Pots of Earth, as nearly imitating Bogs as can be, and ſet upon *Hot Beds*, minding to refreſh the Earth conſtantly with Water as it begins to dry; houſe this with the foregoing Plant.

Virginian Dog-Wood makes a Tree about the Size of the common *Cherry-Tree*, bloſſoming early in the Spring; the Flowers are white, growing in Branches, and are ſucceeded by red Berries, which hang a long time upon the Tree: Sow them in Pots of light Earth in Autumn, and let them ſtand the *Winter* in the *Green-Houſe*, giving them the aſſiſtance of a *Hot Bed* the following Spring. The *Indians* boil the Roots of this Plant in Water, which they account good to heal Wounds.

The *Saſſafras-Tree* is alſo a *Plant* of *Virginia*, whoſe Figure we may ſee in *Gerhard*'s *Herbal*, but the Deſcription is imperfect: It loſes its Leaves in the Winter, and in the Spring puts forth its Flowers of a yellow Colour in Cluſters, ſucceeded by blue Berries, ſomewhat like thoſe of the *Lauruſtinus*, upon red Foot-ſtalks: Theſe Berries ſhould be ſown at Autum like thoſe of the foregoing Plant; it loves a light Soil, and I believe it might be made to grow in our Woods, after it is a little harden'd and uſed to our Climate.

The *Virginia Wild Crab-Tree* has Bloſſoms ſomewhat like the *Apple*, but very pleaſant to the Smell; it bears ſmall Fruit, of a yellowiſh Colour, and well ſcented, which the *Indians* preſerve in *Sugar*: This is raiſed from Seeds ſown in *March* upon *Hot Beds*, and loves a light dry Soil; houſe it with the others of this Country 'till it becomes hardy enough to be planted abroad.

The *Virginia Myrtle*, or *Candle-Berry Tree*, is Ever-green, and Aromatick; it bears Berries about the Size of a ſmall *Vetch*, from which is drawn the *Green Wax* which *Candles* are made of: This *Wax* partakes ſo much of the natural Scent of the *Plant*, that the leaſt Bit of it being burnt upon Coals will perfume a whole Room. The Berries muſt be ſown at Autumn in Pots of black ſandy Earth, and kept continually moiſt, as well before they ſprout, as after they come up; let this be houſed with the foregoing Plant.

It would be endleſs to enumerate the ſeveral Trees and Shrubs of foreign Countries that are propagated in *Green-Houſes*; and I doubt not but ſuch as will mind the foregoing Directions in this Chapter, will eaſily, from Experience, diſcover the right *Culture* of whatever *Plants* they get into their Collection. In the mean time I ſhall proceed to lay down the beſt Methods of treating ſuch kinds of Plants as abound in Juice, and are called *Succulent Plants.*

CHAP. V.

Of ALOES, TORCH-THISTLES, MELON-THISTLES, FIG-MARYGOLD, HOUSE-LEEKS, *the* EUPHORBIUM, *and other* Succulent Exotick Plants, *their* Culture.

THE *Plants* which I deſign to treat of in this Chapter are commonly ſtiled *Succulent*, for that they are plump and full of Juice, which they chiefly gather from the Air, as by Experience we find, witneſs the *Sempervive*, a kind of *Aloe*, which will live ſome Years without Earth or Water, being hung up in a Room, and the *Sedum Arboreſcens*, which I have known to be kept after the ſame manner for many Years; in which *Plant* it is obſervable, that againſt Rain it puts forth Roots or little Fibres ſtriking into the Air, which in damp Seaſons is thick enough to afford it that Help, and ſome Nouriſhment; but as ſoon as the Air begins to grow thinner, and is more rarified, thoſe Roots dry up before they can provide themſelves with Nouriſhment ſufficient to ſupply the Plant they ſpring from, which perhaps they would do, if they could enjoy that thicken'd Air three or four Months without Alteration.

The firſt Kind of *Succulent Plants* I ſhall mention, is the *Aloe*, which in my Opinion is the moſt beautiful Tribe of *Plants* belonging to the *Green-Houſe*. The moſt common Kind in our *Gardens*, with ſome few other ſorts, are brought from *America*; but the greateſt Varieties of them, and I think the beſt Kinds, come from *Africa*, chiefly from the *Cape* of *Good Hope*. *Aloes*, for the moſt Part, are compos'd of many Succulent Leaves, long and ſharp at their Points, commonly arm'd with *Spines*: The Leaves ſpring immediately from the Root, and are placed in a Round, repreſenting the Rays of the Sun; from their Center ſhoots forth the Flower *Stem*, which ſometimes divides it ſelf into Branches, but not always: Upon theſe *Stems* appear the Flowers which are *monopetalous*, but oftentimes are ſo deeply cut on the Edges, that without ſtrict Examination they appear to have ſix-*Petals*; they are the moſt like the Flowers of the *Hyacinth* in their Figure, but are ſeldom ſweet-ſcented, and each Fruit has little black Seeds in it, lodged in three ſeparate *Cells*.

Some *Aloes* are arboreſcent, inclining to make large Trees, breaking forth into Branches; as one ſort which has Leaves ſomewhat ſhaped like thoſe of a *Narciſſus*, but larger, more ſucculent, and of a whitiſh Colour; but this is ſo rare, that I know not of any Plant of it in *England*, but what I brought with me from abroad, and have now growing. We have other Kinds, which are ſo ſmall, that a whole Plant does not exceed the bigneſs of a Crown-piece; ſome grow cloſe to the Ground, others are more aſpiring, and have their Crown of Leaves raiſed upon a Stem ſomewhat above the Earth: In ſhort, they are ſurpriſingly different from one another, and deſerve our Care and Admiration as much as any Plant whatever.

I have ſeen about ſixty different Kinds of *Aloes* in the *Phyſick Garden* of *Amſterdam*, chiefly the Product of the *Cape of Good-Hope*; ſome of them have been raiſed from *Seeds* from that Place, and others from young *Plants* riſing from the Roots, or putting forth from the *Stems*; theſe are uſed with great Tenderneſs in *Holland*; but I find they are as hardy as any other Plant growing about the *Cape*; for of the forty Sorts, which I have cultivated for the three laſt Years, I have not loſt one by Cold, but I find it is Wet chiefly that injures them. In *Africa* they all grow in Stony Places, and upon Rocky Ground; therefore the Earth I prepare for them is one half ſandy Soil, and the other Rubbiſh of old Walls well ſifted and mixed together, which contributes to keep them from rotting at the Roots; and in Planting them, I obſerve always to ſet them very ſhallow in the Pots, raiſing the Earth in that manner, that the *Plant* ſtands as it were upon a Hill, falling every way to the edge of the Pot; ſo that when they require any Water, it may be given them without touching any Part of the Plant; which if it ſhould ſo happen, unleſs the Sun immediately dries it up, the Plant would be in danger of rotting.

In the *Summer* indeed, when they are abroad, a little Rain will not hurt them, becauſe they then cannot remain wet very long, otherwiſe the Wet that will infallibly ſettle in the Heart of the Plants when the Rain falls upon them, would deſtroy 'em: I therefore chuſe to keep them in the Houſe 'till *June*, and return them thither from abroad in *Auguſt*, to avoid the Danger of too much Moiſture, which they can hardly meet with between thoſe Months.

While they are abroad, if the Weather be fair, they will require moderate Waterings once a Week, if their Earth is very dry: And from the time of their Houſing, 'till the middle of *October*, gentle Refreſhings may be given them in the Mornings, while the Sun is upon them, for then is the time of their Growth: But from *October* to the middle of *March*, or thereabouts, they muſt be kept very dry, and not have the leaſt Moiſture, tho' the Earth be like Powder; for they cannot diſpenſe with any wet till the Sun begins to grow powerful with us, and can dry it immediately. In *May* give them freſh Earth and they may be tranſplanted at that Seaſon, but without diſturbing the Roots: But the beſt time of the Year for that Work is the beginning of *Auguſt*, when they will beſt be diſpoſed to make freſh Roots; and this muſt be done about ten Days before they are ſet into the Houſe, for the open Air helps them to ſtrike the Roots, as I ſhall endeavour to prove.

I once had ſome Off-ſets and Branches of *Aloes* ſent me in *May*, without any Roots; and after having let them lie in the Sun for three or four Days, to dry and heal the wounded Parts, I put them in *Hot Beds*, according to the uſual Method; but with all the Art I could uſe to them, I found they ſenſibly declin'd, till at laſt they were reduced almoſt to nothing; I then ſo far diſpair'd of ſaving them, finding the Summer almoſt paſt, that in the beginning of *Auguſt* I flung them out of my *Garden* careleſly, with ſome other things that had ſuffer'd in the ſame manner; but to my great Surpriſe, after they had lain abroad about three Weeks, they ſtruck Roots into the Ground they lay upon, and began to ſhoot out freſh Leaves: By this Accident I not only ſaved the *Plants*, but took ſuch Methods for the Management of others of the like Kind, that now I do not know any Plants in better Health than my own; and I find the beſt Seaſon for Planting the Off-ſets of *Aloes* is about the middle of *July*, letting them ſtand abroad about ten Days, and take the Rain if poſſible; when they begin to ſtrike Root, then they may be help'd with a *Hot Bed*, but not before. The Seeds of many Sorts ripen in *England*, and may be ſown upon *Hot Beds* in *April*.

I obſerve that ſuch *Aloes* as put out their Off-ſets above Ground, *i. e.* from the ſide of their Stems, may be made to ſet out thoſe young Shoots for Increaſe, by taking away ſome of the under Leaves which grow next the Earth; for from thoſe places where the Leaves are grown, will always ſhoot forth young *Aloes*; but this Work ſhould be carefully done without bruiſing the Stem or other Leaves, and at ſuch a time in the *Summer*, when the *Sun* is in its greateſt force: For altho' the Leaves will eaſily peel from the Body of the Plant without breaking, yet there will be a Moiſture remaining about the Part they were join'd to, which would breed Moldineſs, and be apt to rot if it was not quickly dry'd up.

This and all other *ſucculent Plants* are ſo ſenſible of the leaſt Bruiſe, that I have known many die by that Accident; to pinch one ſingle Leaf will mortifie a whole *Plant*, unleſs the bruiſed Part be preſently cut off.

We may ſee the Figures of many kinds of *Aloes* in Dr. *Comelin*'s curious Books of *Plants*; many of which He has given us, with their *Flowers*, and are extreamly well deſign'd. The more hardy this kind of Plant is kept, the more apt it is to flower, which I know from Experience, having not leſs than twelve Sorts, which bloſſom with me every Year.

The *Torch Thiſtle*, or *Cereus*, is a *Plant* very different from any other *Tribe* of *Plants*, in that it never bears any Leaves. I have cultivated about ſeven Sorts of it, without reckoning thoſe other Kinds of *Torch*-like *Plants*, which have milky Juice, and are reckon'd of the *Euphorbium* Race. I do not yet find that any of the *Torch Thiſtles* grow in any other part of the World but in *America*; nor can I learn that the *Euphorbiums* are found any where naturally growing but in *Africa*. The *Torch Thiſtles* are of two Sorts; ſome creeping upon the Ground, and the others growing upright to a great Height without Support. The creeping Kinds are more enclining to branch than the others, and take Root eaſily as they run upon the Ground: The Branches of the creeping Kinds are differently ſhaped, in that one ſort pretty common in *England*, has triangular Branches, and the other has its Sprouts divided into ſix or ſeven Angles; both theſe have the Edges of their Angles adorn'd with ſmall tender Spines ſet together in the form of Stars: The Flowers of the firſt I have not yet ſeen, but the latter has bloſſom'd in *England*, which yet perhaps it would not have done without an Accident: A large *Plant* of it that ſtood in the Neighbourhood of a plaiſter'd Wall, ſtruck its Roots into it, and ſoon after dying at its firſt Root, it remain'd ſome time nouriſhed by the Wall only, and in that condition ſet for Flowering: The Bloſſoms were very large, radiated ſomewhat like the *Sun-Flower*; many of the *Petals* were of a yellow Colour, with ſome few, towards the middle, of a fair White. This Flower ſtood upon the Summit of the Fruit, like thoſe of the *Indian-Fig*; and when it opened was extreamly well ſcented, but ſoon decay'd. Whoever conſiders that this *Plant* grows naturally upon Rocks, will not wonder at its Flowering when it grew in Lime Morter, which comes the neareſt to a Rocky Soil of any we can compoſe.

I have therefore choſe to plant both theſe creeping Kinds of *Torch-Thiſtles* in Rubbiſh of old Walls mix'd with about one Third of ſandy Soil, and ſome ſmall Pieces of Free-Stone among it; for this Mixture will keep the Roots dry, and grow hard as a Rock, after it has been well water'd: Theſe are both raiſed from Cuttings planted in this Mixture any time between *May* and the end of *July*; but we muſt firſt obſerve, that they lie in the Sun for a Day or two after they are cut, to heal their Wounds, and not put them into the Ground before they are dry'd, which we muſt alſo remember to do with all Cuttings of *ſucculent Plants*. Plant theſe as I direct for the *Aloes*, upon a little Hill in the middle of the Pot, for they can hardly endure Water: Let them, after Planting, ſtand abroad about twenty Days to take Root before they are put into the *Hot-Bed*, for elſe they will be apt to ſhrink; and at firſt putting them in Pots, water them to ſettle the Earth, but with this Caution, that it be done when the Sun has Power enough to dry and harden the Mixture they are planted in. During the Summer they may now and then be gently refreſh'd; but from the middle of *September* till *May* I would not adviſe any Water: Some have planted them in light ſandy Soil, and they have ſhot well in the *Summer*, but would ſeldom live 'till the *Spring*: In a word, keep them as dry as poſſible in the Winter, and let them have the open Air (after Rain eſpecially) in the *Summer*,

Summer, as much as you can give them; for 'tis what they chiefly feed upon, as we may know by their putting out of long *Fibres* from their Branches at ſuch Seaſons. This kind of Plant comes from thoſe Parts of *America* near the *Line*, therefore are not ſo hardy as *Aloes*, and ſhould be kept more in the Houſe, and ſet in the warmeſt Places.

The *Erect*, or *Upright Kinds*, have generally much larger Stems or Branches than the others, and the *Spines* upon their Edges very ſtrong, which are various in their Length and Colour, as the *Plants* they belong to are different; and the ſeveral Kinds of this *Plant* likewiſe differ in their Colour and Number of *Ribs* or *Angles*. The Upright Sorts, as I obſerve, never offer to put out any Branches, as long as their firſt Stem can preſerve its Top from damage; but as ſoon as that is crop'd or injur'd, then they commonly put forth freſh Shoots near the place where it was cut or broke off, about three or four in Number, which grow upright. Sometimes the *Great Upright Torch-Thiſtle* will continue growing in one Stem 'till it be near twenty Foot high, without putting out any Buds but thoſe for Bloſſoms: The Flowers are radiated with whitiſh *Petals*, which do not open 'till the Fruit upon which they ſtand, ſeems to be full grown. This Kind, as well as the others of this

Tribe,

Tribe, is eaſily raiſed from Cuttings planted in any of the *Summer* Months, but beſt in *May*, to cut a Stem of any of them into pieces of ſix or ſeven Inches long, and let them lie in the *Sun* 'till their Wounds are dry; every Cutting will ſoon take Root if they be ſet in Pots of light Earth, and kept pretty dry 'till they begin to ſhoot, and then ſome of the Mixture prepared for the Creeping Kinds ſhould be put to their Roots, and as much of the light Earth as poſſible taken away: The Reaſon why I do not chuſe to plant them in this Mixture at firſt, is, becauſe the Roots will more readily form themſelves in the other Earth. When theſe *Plants* begin to grow, they will put out little Buttons near their Tops, which will afterwards form ſo many Stems, excepting only that Cutting, which was the running Top of the *Plant*, and that will ſhoot upright. When the little Stems are about four or five Inches long, they may be cut; and after drying in the *Sun*, be planted like the others.

I can ſay no more concerning theſe Plants than I have done of the Creeping Kinds, unleſs it be, that what I call the *Great Upright Torch-Thiſtle* is eaſily preſerv'd in any *Green-Houſe*, and is not ſo hard to be kept as the others; that is, it will thrive better in a plain ſandy Soil than in the Mixture I have preſcrib'd for the others of this Tribe, and will bear more Water in the Summer. The

Figures of all theſe Kinds, I think, are no where cut but in my *Hiſtory of Succulent Plants.*

The *Melon-Thiſtle*, or *Echinomelocactos*, is a very wonderful Plant; I have had only two Sorts of it, *viz.* the large Kind growing in *St. Chriſtophers*, and other *Caribby Iſlands*, which is cut in *Gerard's Herbal*; and the ſmall Kind, which is figured in the *Paradiſus Batavus*, named in that Book *Echinomelocactos minor Lacteſcens abſque tomento Cylindris Strictioribus.*

The firſt is a ſolid Plant, growing out of the Ground like the Fruit of a large *Pumkin*, but ribb'd like a *Melon*, and very green; upon the Edges of each Rib are long *Star*-like Thorns, placed one above another, of a *Coffee* Colour: On the Top of this *Melon*-like *Plant*, grows a large Lump of a *Cotton*-like Subſtance, cover'd over on the Outſide with ſhort tender *Spines* of a *Cinamon* Colour; out of this burſt forth the Fruit (in a hot Day) full ripe, about the Size and Colour of *Cornelian Cherries*, and commonly drop off two Hours afterward. There is now one of theſe *Plants* in the *Stove* at *Hampton-Court*; it is call'd in *Barbadoes*, *Popes-Head*, or *Turks-Cap*.

The other ſort ſeldom exceeds the Bigneſs of a large *Apple*, growing out of the Ground like a ſolid Fruit, and cover'd over with little Knots, ſomewhat reſembling green

Berberries ſet cloſe together, and little Stars of Thorns at their Points, of a *Cinamon* Colour; the Fruit of this, like the former, cracks out in hot Weather, full ripe, of the Shape and Colour of a ripe *Berberry*, but theſe remain upon the Plant a long time. I could have been more particular about the Deſcription of theſe ſtrange Plants, but as they will be engraved and deſcribed in my third *Decade of Succulent Plants*, I ſhall therefore refer my Reader to that Account of them.

Theſe both grow upon Rocks in *America*, near the *Line*, ſo that they are very tender; but being humour'd in their way with a proper Soil, and kept dry, may be preſerv'd as well as the *Torch-Thiſtles:* I have raiſed the ſmall Kinds from Seeds ſown in *Lime*-Rubbiſh, which I afterwards preſerv'd for ſome time, but they were not hardy enough to reſiſt the hard *Winter*. The beſt way to provide our ſelves with theſe *Plants*, is to have them brought from *America* well grown and kept without Water during their Paſſage.

The *Indian-Fig*, or *Prickly-Pear*, is called *Opuntia*, and *Ficus Indica*; there are many different Kinds of this Plant chiefly growing in *America*, from whence I have had about eight or nine diſtinct Sorts: This Race of Plants are ſaid to grow one Leaf out of another, but they are rather Branches than

Leaves; the Leaves properly being thoſe little Buds which appear always on thoſe Parts where the Thorns afterward put forth. However, ſince what I take to be Branches have generally been called Leaves, I ſhall yet continue that Name to 'em. This Tribe of *Plants* then, differ chiefly from one another in the Size of their Leaves, the Colour of their Flowers and Fruit, and the Length and Colour of their Spines; the Leaves of all of them are generally of an Oval Figure; ſome Sorts have them near a Foot in Length; and others not more than two or three Inches; their Leaves are generally ſet with Knots of Thorns at certain Diſtances; ſome ſo very long, that the *Indians* make uſe of them as Pins: Others have the Thorns ſo ſhort, that they are hardly to be perceiv'd, and thoſe ſmall Thorns make the *Cow-Itch*, and can hardly be got out of ones Fleſh in a Month, if they are not carefully ſought after at firſt: In this Tribe the Fruit always appears before the Flower; and when it ſeems to be full grown, the Bloſſom opens at the End of it, with about ten *Petals* and a Cluſter of *Chives* in the middle: This Flower always opens in the Heat of the Day, and ſhuts up when the *Sun* leaves it: When the Fruit is ripe it is generally of a ſtrong red Colour, and has this Singularity in it, that if it be eaten, it will make the Urine of the Perſon as red as

Blood, but without any ill Effect; the Flowers are commonly Yellow, excepting one ſort, which bears Scarlet Bloſſoms, and is more tender, and hard to be kept than any of the others, and very apt to rot: Some of them delight to creep upon the Ground, others grow more upright; but all of them delight in Stoney Places and Rocks; therefore I give them Earth made with Lime-Rubbiſh and ſandy Soil in equal Quantities, planting them in Pots, as I do the *Aloes*, upon little Hills rais'd above the reſt of the Earth; they may for the moſt part be water'd like the *Torch-Thiſtles*, and ſhould have Warmth anſwerable to the Climates they come from. We have a ſmall Sort which comes from *Italy* with round Leaves, that will ſtand abroad all *Winter*, and bear Fruit plentifully; and the *Carolina* Kind, and the *Virginia* Sort, will likewiſe live out of Doors under the Shelter of a warm Wall; theſe are all raiſed by planting ſingle Leaves about two Inches deep in Pots of the prepared Earth, (after their Wounds are dry'd) and letting them ſtand abroad 'till they ſtrike Root, before they have the Help of a *Hot-Bed:* And I obſerve, to ſet them upon Leads, or ſome Stone Pavement, expos'd to the *Sun*, contributes to make them ſhoot with greater Vigour: The Plantations of the Leaves ſhould be made in the *Summer* Months, and they ſhould be houſed with the *Aloes*.

The *Ficoides* is a Plant ſo different from other Kinds, that Authors have greatly varied in the Name of it; ſome eſteem it like the *Criſanthemum*, or *Corn-Marygold*; others make it a Diminutive of the *Opuntia* or *Indian-Fig*; and indeed it has this likeneſs to the latter, that the Fruit is always form'd Before the Flower opens,and is not unlike a *Fig* in its Shape: The Flower is radiated ſomewhat like the *Marygold*, and therefore the *Engliſh* Name I give it in my *Decades* of *Succulent Plants*, is *Fig-Marygold*, which in my Opinion is a Name in our Language as proper for it as *Ficoides*; the Leaves of this *Plant* are always ſucculent, and it is rare to find one in this numerous Tribe that has not conjugated Leaves, that is, Leaves ſet on in Pairs at the Joynts.

In the *Culture* of fifty ſorts of this *Plant*, I do not remember to have met with one that was not a Native in *Africa*, chiefly about the *Cap* of *Good Hope*, from whence we receive them; they commonly grow in ſtoney or rocky Ground, in ſuch places where they have not much Wet, and are eaſily propagated either from *Seeds* or *Cuttings*: The *Seeds* may have the help of a moderate *Hot Bed*, if they are ſown early in the Spring; but the Cuttings being planted in a Natural Bed of Earth in *May* will proſper very well, and be fit to put into Pots the *Auguſt* following, in which Condition they may yet remain abroad till about the 20th of *September*, for they delight in the open Air, and are not eaſily overcome with ſmall Froſts. As to the time of their Duration, I find many of the Shrub Kinds require to be renewed every ſecond or third Year, and likewiſe the Running or Creeping Kinds; for *Plants* of three Years old often drop off; or if they live, are generally ill-ſhapen and ragged; it is practiſed in ſome places to raiſe theſe Cuttings upon a Bed made with *Tanners-Bark*, which is a Mixture that affords a gentle Heat for three or four Months, without ever burning; therefore it would be of great uſe to raiſe young *Orange-Trees* upon, or other ſmall Plants: Some Kinds of this *Plant* are *annual*, and therefore muſt be raiſed from Seeds every Year, as one Sort eſpecially, which of late has been pretty frequent among us; it has at firſt coming up, Leaves ſomewhat like thoſe of the *Arrow-Head*, cover'd with little Bliſters of clear Juice, which appear like ſo many Diamonds, and give a notable Luſtre when the *Sun* ſhines upon the *Plant*; but as this Plant grows bigger, the Leaves grow ſmaller and change their Figure; it puts out many Branches cover'd with tranſparent Bliſters, and Bloſſoms about *September*, bearing ſmall white Flowers; but this, like other *Annuals*, will ſtand the *Winter*, if we raiſe young Plants of it about *July* or *Auguſt*, that do not attempt to bloſſom in 3 or 4 Months. There is another Claſs of the *Fig-Marygold*, which are *Dwarfs* and *Aloe-form'd*, growing always near the Ground without branching; moſt of them will remain five or ſix Years without renewing, but may perhaps be ſubject to loſe ſome of their Leaves lying next the Earth, if the Surface of the Earth is not cover'd with ſifted Lime-Rubbiſh, which contributes to ſuck up the Wet, and keep the Leaves from rotting; theſe Dwarf-Kinds have commonly the moſt ſucculent Leaves, and thereford are more endanger'd by Wet than the others; ſo that I always plant them upon little Hills in the middle of the Pots, as I have adviſed for the *Aloes*: So likewiſe ſome of the Creeping Kinds, that have very ſucculent Leaves and tender Stalks, ſhould have the top of the Earth they run upon cover'd, with a thin Coat of Lime-Rubbiſh, or Sea-Coal Aſhes, to prevent their rotting by too much Wet: The Earth for every Kind of this Plant ſhould be light and ſandy, with about one fourth Part of Rubbiſh among it.

The *Shrub* Kinds, which have their Stalks woody, will bear moderate Waterings; but the others, which are more ſucculent, muſt have very little Water. This Tribe of *Plants* ſhould always have the Advantage of the Sun, for they will never open their Bloſſoms without it, excepting two Kinds which only flower in the Night. As I have already dy publiſh'd the Figures of many of theſe Plants, and am ſtill about engraving many more of them in the *Hiſtory of Succulent Plants*; ſo I ſhall refer my Reader to that Work for their particular Forms and Uſes; the *Cuttings* of theſe *Plants* ſhould not be planted before their wounded Parts are dry.

We have great Varieties of *Sedums*, or *Houſe-Leeks*, from the *Cape* of *Good Hope*, which are not leſs beautiful than the *Fig-Marygolds*, and are eaſily propagated by the ſame Means. Dr. *Commelin* has given us the Figures of ſeveral of them among his *Amſterdam Plants*, and therefore I ſhall ſay little relating to them; but the *Tree Kind*, or *Sedum Arboreſcens*, which is the largeſt of them, I cannot well paſs by, without taking notice of it, as one of the moſt beautiful *Plants* belonging to the *Green-Houſe*, eſpecially that ſort of it which has its Leaves variegated with Green and Yellow, and alſo has very often thoſe Leaves tip'd with Purple; it loves a light ſandy Soil, and is eaſily propagated from Branches ſet in the Earth in any of the *Summer* Months, giving them very little Water, and as much Air and Shade as poſſible in the *Summer*, and no Water at all in the *Winter*. I obſerve, the Method I preſcribe for them in the *Summer*, contributes to make them more beautiful in their Leaves than thoſe thoſe that are drawn under *Glaſſes*, or expoſed to the *Sun*, which is a common Error: In a word, every Plant that feeds upon the Air, as this does chiefly, muſt be treated in the ſame manner, if we have a mind to keep them in their beſt Colours; for too much *Sun* to *Aloes*, and ſuch like *Plants*, is apt to change the Colour of their Leaves.

The greateſt Varieties of the *Euphorbium* that I have yet ſeen are in the *Amſterdam Gardens*; they are in Shape and Manner of Growth very like the *Torch-Thiſtles*, but have not Star-like *Spines*; however they do not want ſome Thorns to defend their Edges, which vary in their Figures as the Plants are different: All this Race abound in poiſonous milky Juice, which flows from them in great Abundance when thy are wounded; ſo that the Cuttings taken from them for Increaſe, muſt be well dry'd in the Sun before they are put into the Earth. The Mixture which I direct for the *Torch-Thiſtles* is the moſt proper for this kind of Plant, which delight in rocky Soil, and requires very little Water; theſe are moſt of them very tender, like the *Torch-Thiſtles*, and may be kept in the Houſe all the Year about, and ſtand in the warmeſt Place of it: We may raiſe them in any of the *Summer* Months with the Help of a *Hot Bed*.

The *Frittilaria Craſſa* is a ſmall Creeping Plant, imitating, in the manner of its Growth, the *Torch-Thiſtles*, ſhooting one Branch out of another: It has neither Spines nor Leaves that ever I could diſcern, but bears very large Flowers about four Inches over, ſpeckled with Black and Yellow, like the Belly of a *Toad*; and one Sort has it *Petals* cover'd over with purpliſh Hair or Wool: Theſe Flowers, when they open, have a very ungrateful Smell like *Carion*, and ſoon are cover'd with little *Inſects* about the Centre of their Bloſſoms. The Stems of the ſmalleſt Sort are generally of a browniſh Colour; but the larger Kind has its Stems very green, if the Plant be in Health: See the Figures of both theſe Kinds in the *Hort. Lugd. Bat.* and Dr. *Commelin*'s Book of *Amſterdam Plants*; We may eaſily propagate theſe Plants by planting their Branches in a Natural Bed of Earth, any time between *June* and *Auguſt*, and they will ſoon be fit to plant into Pots; the moſt proper Earth than for them, is that directed for the *Aloe*: Theſe *Plants* are very apt to rot, and therefore muſt be kept dry in the *Winter*, and have a warm Place in the *Green-Houſe*.

I have now given my Reader ſufficient Inſtructions for the propagating of *Exotick Plants*; and if he ſhould meet with other Kinds than thoſe I have mention'd, I doubt not but he may readily cultivate them, if he diſcreetly conſults the Directions I have given him in this Work.

CHAP.

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Plate III,

Fig VIII.

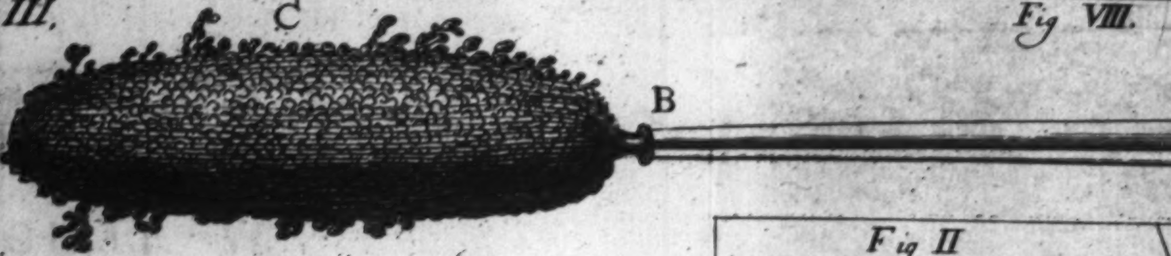


Fig II

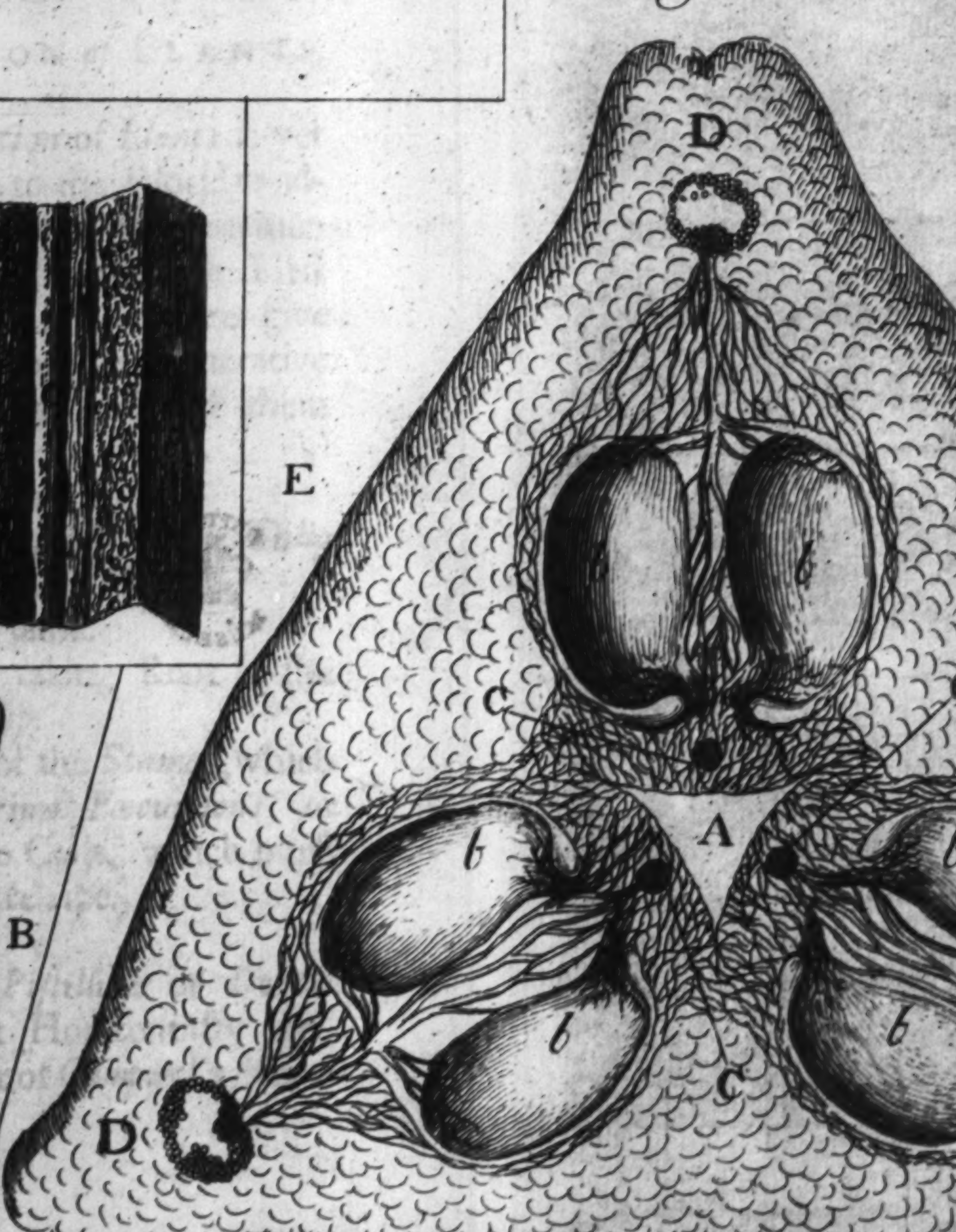
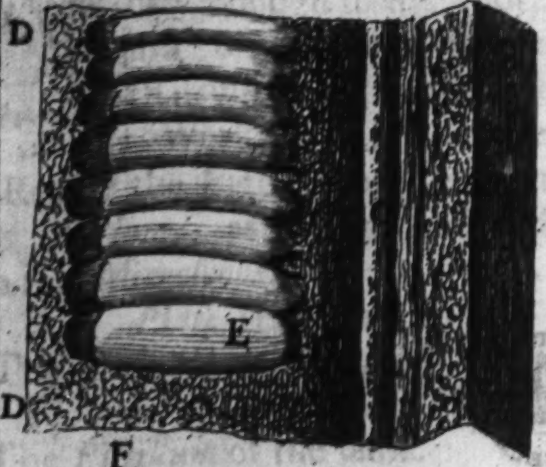


Fig IV



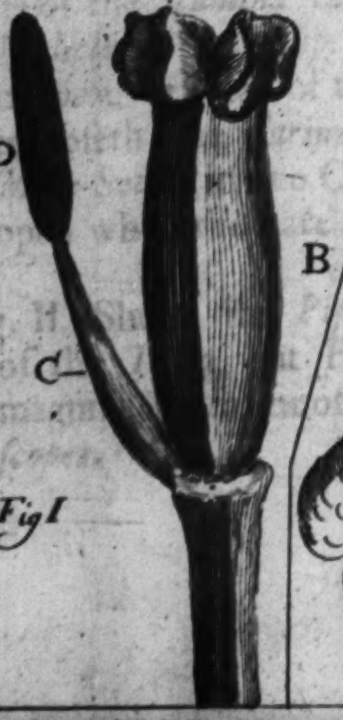


Fig I

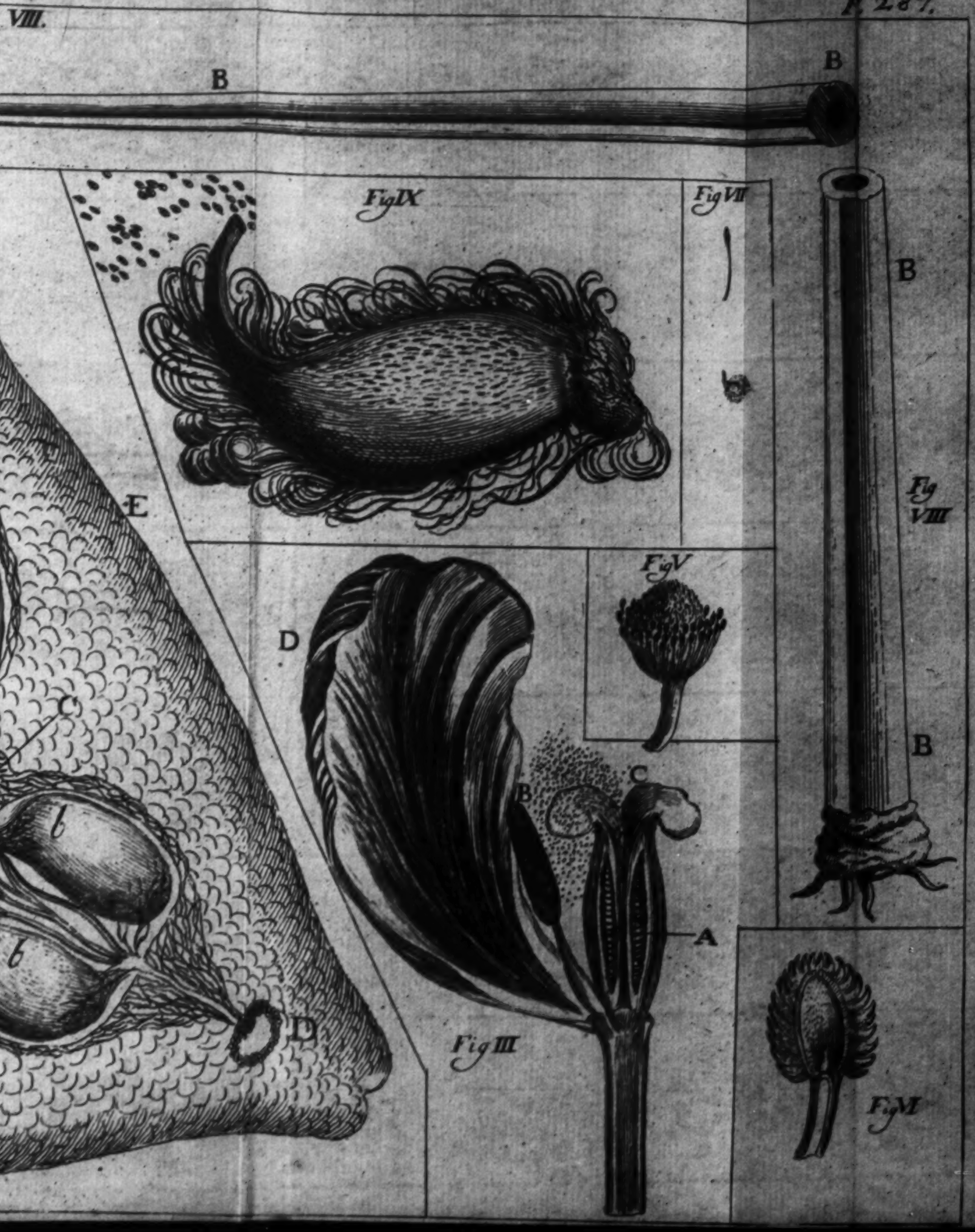

VIII.
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Fig IX
Fig VII
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Fig VI

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CHAP. VI.

Of the GENERATION *of* PLANTS.

As the *Generation* of *Plants* is yet new enough to the World to admit of a further Explaination than what I publiſhed in the Firſt Part of this Work, I ſhall therefore give my Reader the Figures of the Generative Parts of *Plants*, as I have obſerv'd them with the *Microſcope*.

Plate II. *Figure* I.

A The *Pedicile* or *Foot-ſtalk* of the *Tulip* Flower.

B The *Piſtillum* of the ſame.

C One of the *Stamina* taking Root in the *Pedicle* of the *Tulip*.

D the *Apex*, or Head of the *Stamen*, which encloſeth the *Farina Fæcundens*, or *Male-Seed*, in two Cells, which burſt open when they are ripe.

Fig. II. Shews the *Piſtillum* or *Uterus* of the *Tulip*, cut Horizontally and magnified with one of *Campani*'s *Microſcopes*.

A The Cavity of the *Vagina*; the *Tunick* of which Paſſage or Cavity is compoſed of very ſmall Veſſels, which are continued into the ſeveral Coats of the *Ovaries*, and the Eggs within them mark'd b b b b b b; all theſe Veſſels ſeem to take their Riſe from three larger Pipes, CCC, thorow which the Sap aſcends from the Root in Steam or Vapour.

DDD Shew three large Veſſels (whoſe Sap is in Figure of ſmall *Globules* of a bluiſh Colour) thorow theſe Veſſels the Sap deſcends in Liquor.

Theſe large Pipes put forth Branches of Veſſels about twenty times leſs than themſelves, which paſſing horizontally thorow the ſeveral *Ovaries*, are divided into ſmaller *Fibres*, and at length are loſt in the *Tunick* of the *Vagina*; —— theſe are all of a pale blue Colour.

EE Direct to the fleſhy Part, which ſeems to be made up of many tranſparent Protuberances of a pale yellow Colour, leſſening themſelves as they come nearer to the outward Coat of the *Piſtulum*.

Fig. III. Shews the *Piſtillum* or *Uterus* of the *Tulip* ſplit lengthways at A, wherein are diſcover'd two of the *Ovaries* on each ſide the Paſſage of the *Vagina*.

B The *Apex* flinging out its Duſt which falls upon C the outward *Oſtium* of the *Uterus*, compoſed of ſpongy Folds, which emit a gummy Liquor.

D One of the *Petals*, or *Flower-Leaves*, taking Root on the *Pedicle*. *N. B.* This Figure is not magnified.

Fig. IV. Shews part of the *Piſtillum*, ſplit like that in the former Figure, but magnified.

A Is the Cavity of the *Vagina*, into which the *Farina* is ſuppoſed to fall.

C Is the Paſſage of one of the Veſſels mark'd C in the ſecond Figure.

DDDD The Tunick of the *Ovary* compoſed of many ſmall Fibres.

E The Eggs as they are faſtened to the *Ovary*.

F A ſlender Fiber paſſing lengthways thorow the *Capſula*, and ſeemingly binding the Eggs together.

Fig. V. Is the *Matrix* of the ſingle *Anemone* ſurrounded with its *Stamina* and *Apices*; it is to be obſerved, the Eggs of this Flower are naked, ſtanding on the Outſide of a little Button rais'd in the middle of the Flower.

Fig. VI. The Button with the Eggs on its Outſide ſplit lengthways.

Fig. VII. A is a *Stamen* with its *Apex* of the *Anemone*, of its natural Size.

B One of the Eggs or Seeds of the ſame taken off from the Button.

Fig. VIII. The *Stamen*, with the *Apex* of the *Anemone* magnified. —— In this Figure, at A, we ſee the Root of the *Stamen*.

B B B B The length of the *Stamen*, from its Root to the *Apex*, whereby it appears to be a hollow Tube.

C The *Apex* cover'd with its *Farina*.

Fig. IX. Shews us one of the Seeds or Eggs of the *Anemone* magnified, whoſe outward Coat is cover'd with Capilary Veſſels, curl'd and running into one another, with a View of the Neck or Paſſage, into which the Male-duſt is ſuppoſed to fall.

So have I now compleated the Work I promis'd in my Title Page, and have endeavour'd to give ſomething new in every Part of the *Art of Gardening* which I have treated of.

FINIS.

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